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The Heating and Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

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JUNE, 1922

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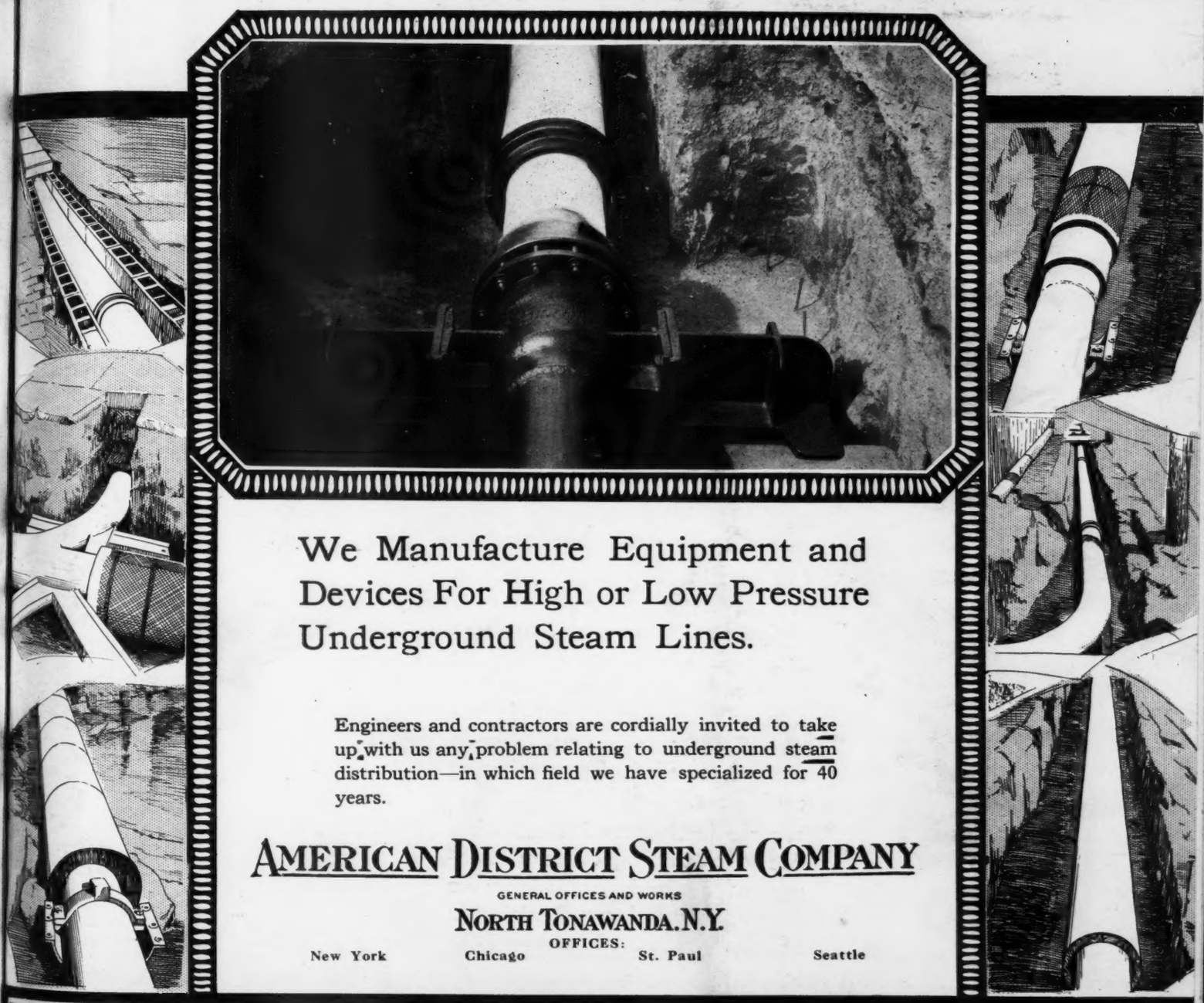

We Manufacture Equipment and Devices For High or Low Pressure Underground Steam Lines.

Engineers and contractors are cordially invited to take up with us any problem relating to underground steam distribution—in which field we have specialized for 40 years.

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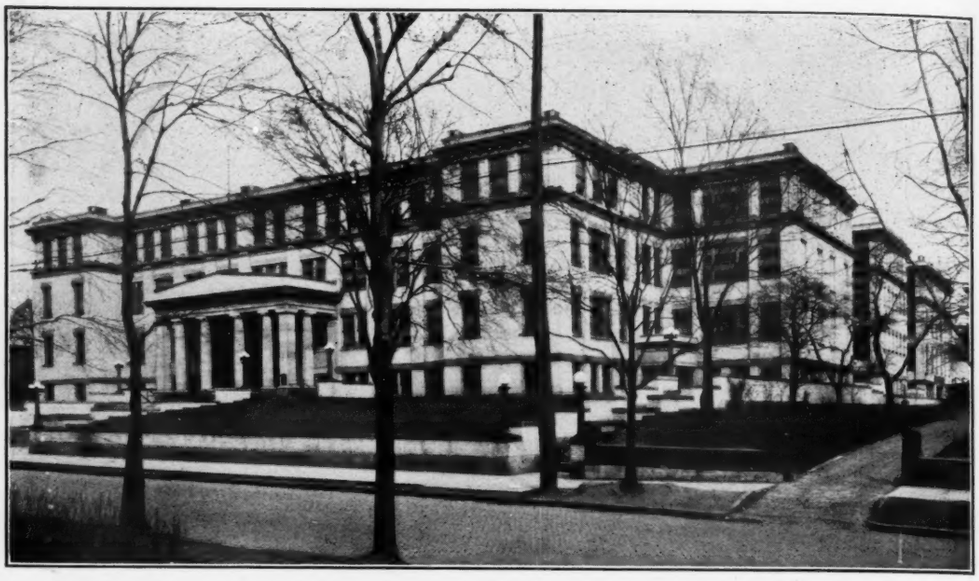

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Architect—H. H. Hammond, Cleveland, Ohio

Engineer—Wm. Kingsbury, Cleveland, Ohio

Heating and Vent. Contractors, Huffman-Wolfe Co., Columbus, Ohio

Selected for the Finest School in Canton

NAMED in honor of Canton's most illustrious citizen, the late President, the McKinley High School is easily the most imposing educational edifice in that section of Ohio. In accordance with the general scheme of the architect, engineer and contractors, to make this high school not only most commendable in appearance but a healthful and comfortable place as well, extreme care was taken in the selection of the ventilating equipment.

We are justly proud that, after due consideration, Clarage Kalamazoo Multiblade Fans were chosen. Two large Multiblade Fans located in the basement keep the entire building supplied with fresh, pure air, properly warmed in winter and cool in summer.

It has been our policy, from the very first, to manufacture a reliable product and to render a conscientious service in connection with the application of this product. Technical training and years of practical experience have qualified Clarage engineers to cooperate intelligently with the architect and the heating and ventilating engineer. If you will afford the opportunity, we will clearly demonstrate that our claims for both product and service are not exaggerated. Send for our latest catalog today.

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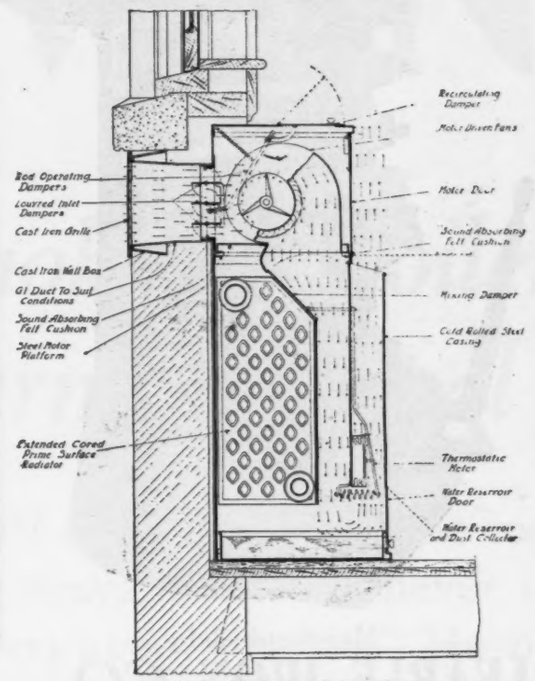
THE MECHANISM OF THE PEERLESS UNIT

A FEATURE

A perfect mixing damper is necessary to properly control room temperature.

Overheating of rooms in mild weather is a common fault with most unit systems due to improperly designed mixing dampers.



The Peerless Mixing Damper will keep your rooms just as comfortable in mild as in severe weather, because it can be so adjusted as to by-pass ALL or any portion of the air around the radiator. It can be arranged for either hand or thermostatic control.

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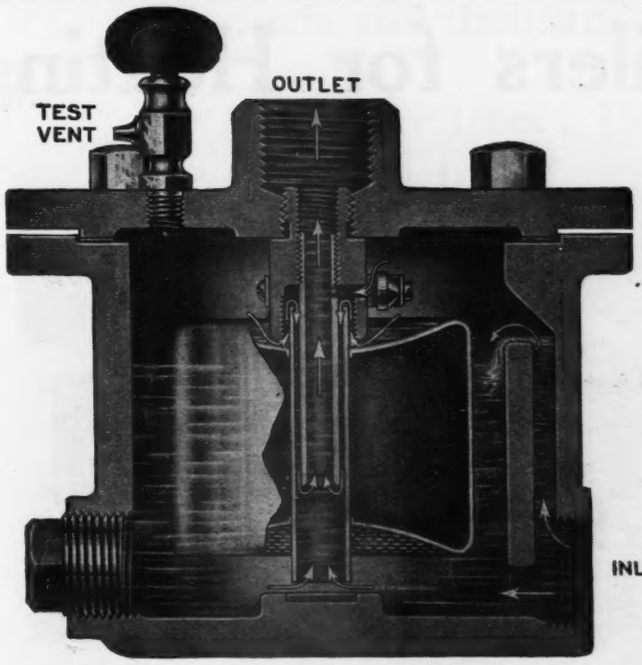

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BLAST TRAP

FOR DIRECT OR INDIRECT COILS OR ANY LOCATION WHERE LARGE QUANTITIES OF WATER ARE TO BE DISCHARGED

Operates automatically either with or without mechanical suction on return line.

No complicated parts to stick or get out of order.

No small openings to clog up with sediment or scale.

Free passage of water—rapid and steady vent of air and passes no steam.

Combined action of flotation for water and all metal thermostatic vent for air together with relief of air through water seal makes the ideal trap for heavy service.

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"Oil City Boilers" will burn any kind of fuel and are constructed to the requirements of all States and to the Code of Boiler laws as adopted by the American Society of Mechanical Engineers.

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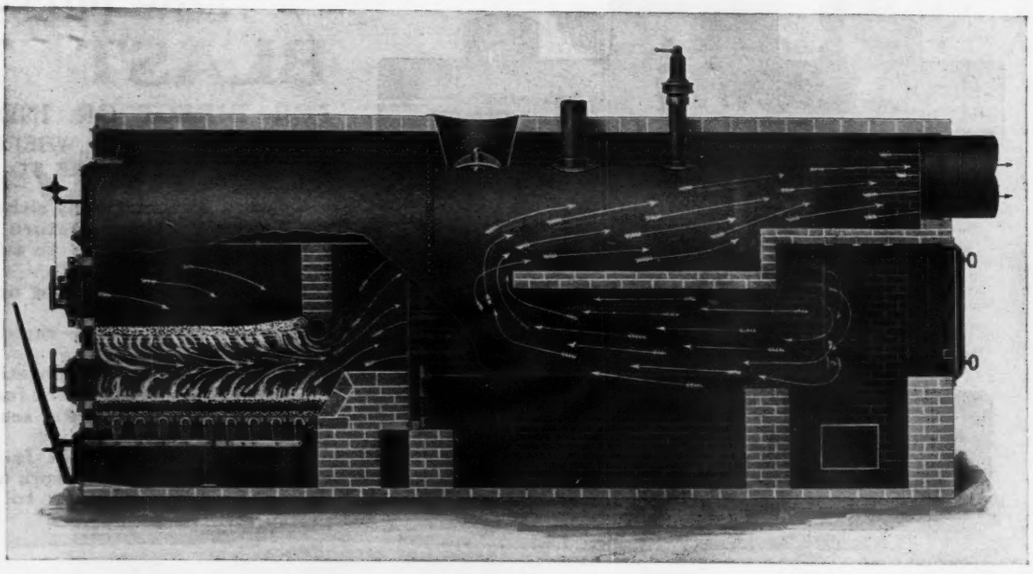
Safety, Efficiency, Economy, Dependability, Durability, No Repairs, Require little attention, Conservatively rated.



Write for Bulletins No. H-7, H-11, H-12 and H-13.

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THE man who buys the coal for a Kewanee Boiler never needs to worry about *what* coal. He merely buys the coal he can buy to best advantage. That saves him hundreds and thousands of dollars.

So the Architect, Heating Engineer or Contractor who specifies Kewanee makes a warm friend of the building owner.

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MINNEAPOLIS	708 Builders Exchange	CLEVELAND	76 Rose Bldg.
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CANADIAN REPRESENTATIVES—The Dominion Radiator Co., Ltd.
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"Here is a boiler that saves me about 10% over my former installation costs"

"All right Old Kill Joy just hop up here and let's see what the INTERNATIONAL people say about the *Economy*.

"Take for instance their suggestions for estimating. The *Economy* delivers dry steam to the mains without building a header when the boiler is being erected. This is a direct saving both for the owner and the steamfitter.

"The sections of the big 47 series are cast in one piece as less labor is required to handle a balanced casting when assembling a boiler.

"Now Old Kill Joy I'm perfectly satisfied that *Economy Boilers* are good boilers because they are built by the INTERNATIONAL HEATER COMPANY. They are nationally advertised which creates consumer acceptance, and are endorsed by many of the leading architects and engineers.

"Their catalog recently issued is one of the best I've ever seen. It puts engineering advice in a non-technical manner and is a wonderful help when suiting the boiler to the job.

"Hop back now, Mr. Kill Joy, I'm going to write the INTERNATIONAL people to send their catalog H-1296 to my list of boiler prospects."

Every heating contractor, engineer and architect should have a copy of our latest boiler catalog H-1296. It contains valuable information on suiting the boiler to the job.

INTERNATIONAL HEATER COMPANY
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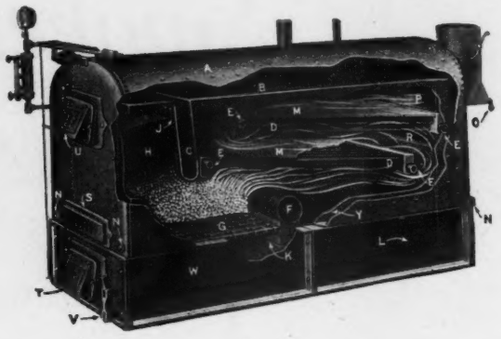
INVESTIGATE

The Latest Herbert Magazine Water Tube Smokeless Boiler



These are a few of the Features

(1) No smoke after the fire is thoroughly started. (2) No Flues to clean. (3) Burns Soft Coal Successfully. (4) Carries steam from twelve to fifteen hours with one fire. (5) Has downdraft and direct draft to suit weather conditions. (6) It is all shell surface, which means economy. (7) Can be set in brick, which gives one more return of the hot gases. (8) No Brick Arches or other flimsy devices. (9) Natural draft and the highest economy. (10) Built in steam sizes from 500 square feet to 25,000 square feet

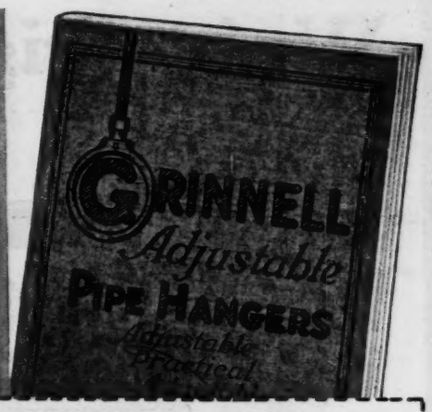
HERBERT

Has combined the downdraft feature with the direct draft and dispensed with the objectionable parts of both.

HERBERT BOILER COMPANY

Root & LaSalle Sts.

Chicago, Illinois



Engineers and manufacturers who did not consign to the waste basket the copy of "That Slim Gray Pamphlet" we sent them are asking for from 10 to 60 copies. Fill in the coupon and one copy will be mailed you for examination. This booklet should be in the hands of every man who is responsible in any way for piping equipment of any kind, *big* or *little*.

Name.....

Address.....

City.....

Business.....

That Slim Gray Pamphlet

"At best!" exclaimed the Chief Draftsman, "it can't be finished inside of ten days."

"You see," explained the Consulting Engineer to the famous sugar magnate who had called in person to demand greater speed, "we stopped work on the Refinery plans and put every draftsman onto that rush Cuban job of yours."

"Draftsmen! That's your lookout, not mine," declared the President testily. "Both plants must be modernized before the new crop comes in. Every tenth of a cent a pound in production cost means thousands a day."

"I've done everything possible. You can't get the trained draftsmen we need—"

"But you don't need college professors to figure a few hangers," cut in the President. "Didn't you answer my wire ten days ago and say 'Plans all ready but hangers'."

"But figuring types and dimensions of 10,000 hangers is some job," said the Chief Draftsman.

"Just have the plans brought in so he can see what it means," said the Consulting Engineer.

Two minutes later a keen looking youth laid a roll of tracings on the table and with them a sheaf of neatly written pages. "Here's the list of hangers on that job," he said hesitatingly.

"List of hangers!"—"Where did you get it?"—"Who worked it out?"—"What kind of hangers?"—

"This looks—like—really looks like a complete schedule," said the Consulting Engineer as he turned the sheets headed—Pipe Rings—Wall Coil Hangers—Saddle Hangers—Pipe Rolls. "Who did this?"

"I did," said the boy nervously. "Took them right out of a slim gray pamphlet."

"Pamphlet—what pamphlet?"

"Why the hanger book."

"There's no book you can get this kind of data from," said the Chief Draftsman, turning to the Consulting Engineer. "It's a matter of careful calculation by experienced men."

"Just a minute, gentlemen," interrupted the sugar magnate. "Boy, you mean a volume—not a pamphlet. Where did you get it?"

"I got it out of the Chief's waste basket," he replied, drawing the slim, gray pamphlet from his pocket and handing it to his questioner.

"My waste basket?" exclaimed the Chief Draftsman.

"Excuse me again, gentlemen," interrupted the sugar magnate. "I'm overdue at my office. Please 'phone me in half an hour if this lad's schedule checks with your plans. I'll bet a hundred to one it does. Companies like Grinnel don't print booklets like this unless they've got something valuable to say. Good morning."

* * * *

Half an hour later the Consulting Engineer told him over the 'phone the figures checked and that blueprints and specifications would be issued for bids the next day, and added, "We are specifying Grinnell Adjustable Hangers. Their use should cut the time of installing two weeks.

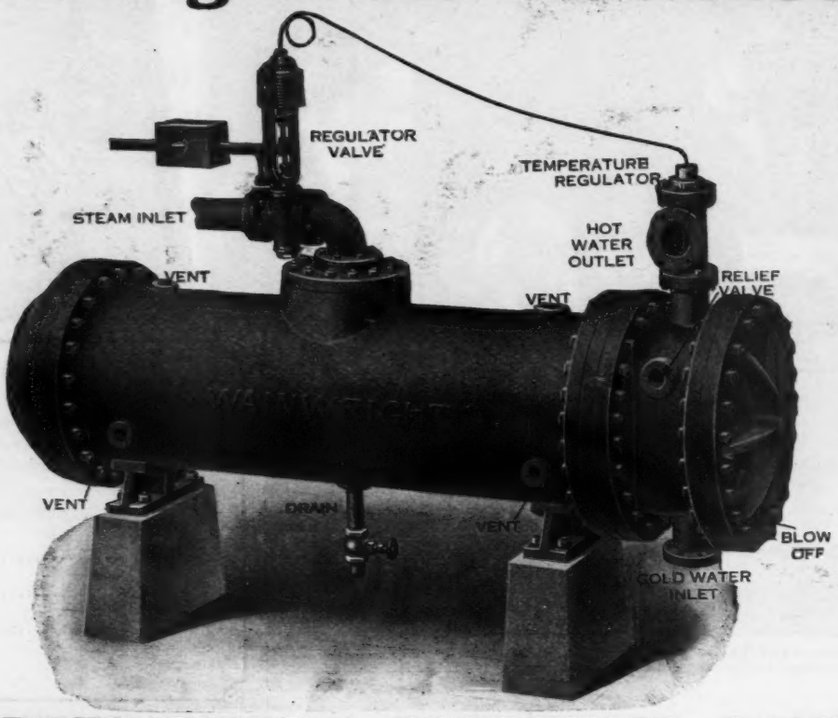
Cut out the coupon. Send it in today. Or simply write and ask for the Hanger Booklet. Address Grinnell Company, Inc., 280 W. Exchange St., Providence, R. I.

GRINNELL COMPANY

Automatic Sprinkler Systems	Steam & Hot Water Heating Equipment	Humidifying and Drying Equipment	Fittings, Hangers and Valves	Pipe Bending, Welding, etc.	Power and Process Piping

If it's Industrial Piping, take it up with us

Wainwright Service Heaters



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140 Cedar Street, New York

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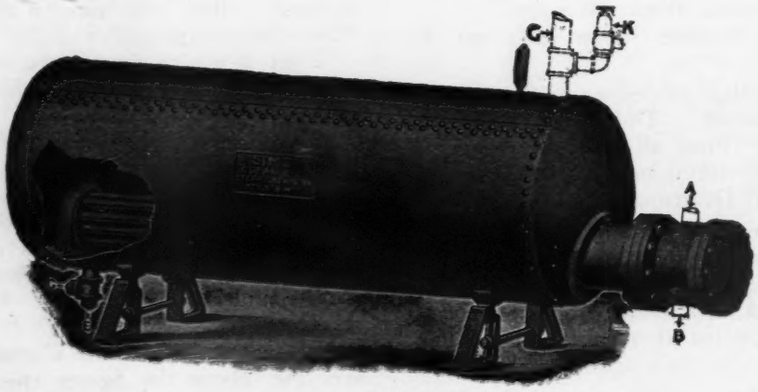
Meet that Peak Demand for Hot Water

WITH A

Sims Clean E-Z Steam Tube Heater



For Hotels, Apartment Buildings, Hospitals, Y. M. C. A. Buildings, Schools, etc.

For Live or Exhaust Steam

Especially Designed for Supplying Large Quantities of Hot Water

Send for tables showing heat capacities using steam at various pressures

"We keep others in hot water"

THE SIMS CO., 18th St., Erie Pa.

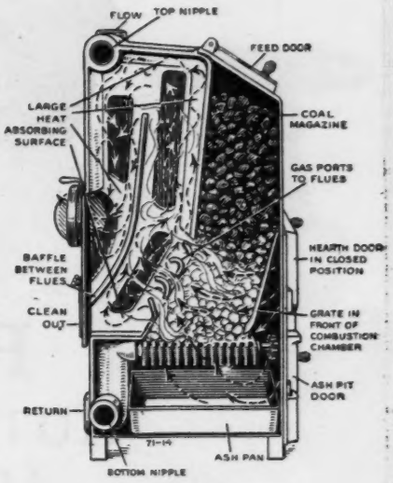
Easily installed in any room having chimney and easily connected to hot water radiators in adjoining rooms—and on floor above.

The Cheery Open Fireplace Appeals to Every Home Lover.

'RADIO' *Heat is Hot Water Heat—and a cheery fireplace too!*

Magazine-feed Downdraft Smokeless Burns Hard and Soft Coal

Made in Five Sizes Conservatively rated 300 to 800 Sq. Ft.



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'RADIO'

Hot Water Heat for Every Room

Open Fireplace Hot Water Radiator

FUEL-ECONOMY, heating-efficiency, ease of operation and attractiveness of design are developed to the highest degree in the 'RadiO' Open Fireplace Radiator.

It is the only hot water heating unit with an open fireplace—the only small coal-burning heater having a magazine-feed and embodying the downdraft principle of combustion.

All-cast iron construction. An ornament in any room.

The thousands of small houses to be erected or remodeled mean a busy, prosperous season for the heating man who will reach out for business with the 'RadiO' Open Fireplace Radiator—and its twin brother for cellar installation—the 'RadeX' boiler.

Installations are easily and quickly made in new houses and old—without (or with) cellars.

Suburban Homes	Offices in unheated buildings
Cottages	Recreation Halls
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'DomiC' Water Heater

An auxiliary heater for domestic water supply. Installed entirely on outside of boiler. All cast iron with provision for expansion. Three sizes.

'RadeX' Boiler
A Millionaires' Boiler for Small House and Small Purse

'RadeX' boilers (steam and water, for cellar installation) possess all the fuel-saving, labor-saving and money-saving advantages of the most expensive types of magazine-feed downdraft boiler—*at a popular price.* Built on lines of the 'RadiO' with water front instead of fireplace. Five sizes.

All 'RadeX' Boilers are tapped for the 'DomiC' Water Heater.

Sign and Mail Coupon to Nearest Office Now—

CENTRAL RADIATOR COMPANY

An 'IRON PRODUCTS CORPORATION' Industry*

43 EAST 42d STREET, NEW YORK

*The Iron Products Corporation—one of the largest foundry organizations in the world—is parent company of The Central Foundry Company, Central Radiator Company, Essex Foundry, Molby Boiler Company, Central Iron and Coal Company and Chattanooga Iron and Coal Corporation.

Central Radiator Co.
43 East 42d St., New York
or
The Central Foundry Co.
Boston, Chicago, San Francisco

Name_____

Address_____

My jobber is_____

I am interested in items marked (X). Send me particulars.

☐ 'RadiO' ☐ 'RadeX'
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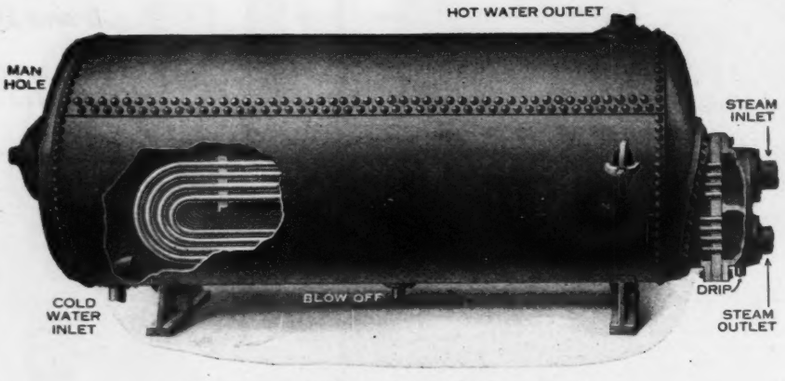

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PATTERSON
HOT WATER HEATERS & HEAT EXCHANGERS
furnish all the hot water
in the
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They completely utilize every available B. T. U. in the returns from the heating system and other sources and show the highest water heating efficiency.

For any Hot Water Service—industrial or domestic—or for any building heated by hot water—either gravity or forced circulating system—there is a Patterson Unit exactly suitable. Let us suggest.

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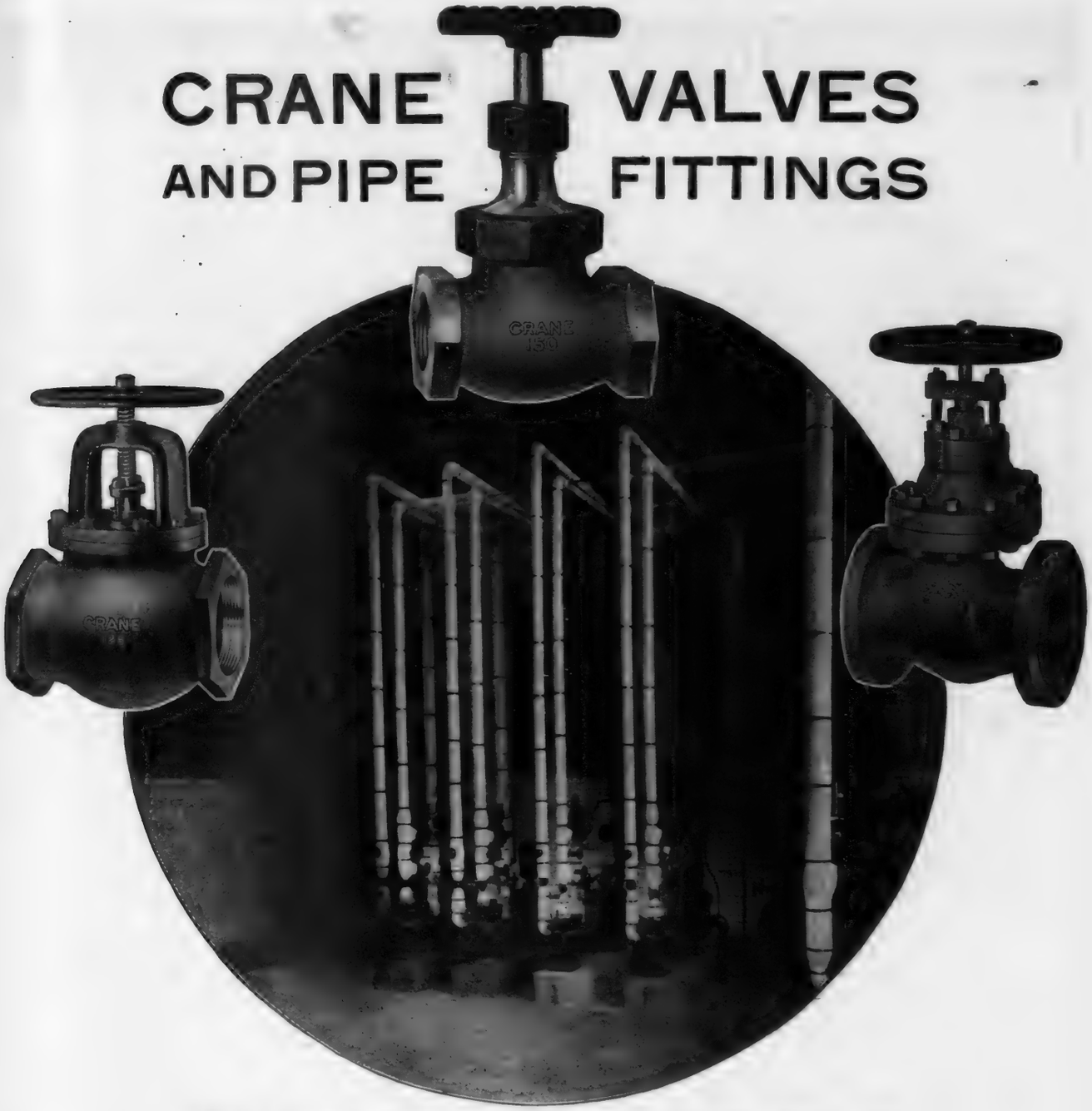

VALVES of established wearing qualities, fittings that insure tight joints, and steam specialties that operate accurately under the exacting requirements of service, strikingly define our facilities for meeting all the demands of modern steam practice.

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CRANE LIMITED — MONTREAL, TORONTO, VANCOUVER, WINNIPEG, CALGARY, REGINA, HALIFAX, OTTAWA.

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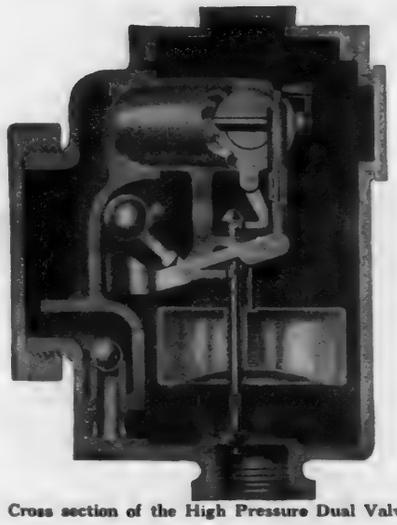
CRANE-BENNETT, LTD. LONDON, ENG.

We are manufacturers of about 20,000 articles, including valves, pipe fittings and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes, and are distributors through the trade of pipe, heating and plumbing materials.

Absolute Elimination of Trap Troubles!



Cross section of the High Pressure Dual Valve

Nothing Ordinary *Because*—

THE **Dual Valve** is a practical, dependable and efficient appliance for use on vapor, vacuum and atmospheric systems of heating, also high pressure duties. It has incorporated in its construction all of the modern features of the two ordinary devices used for the same duties with all impracticable and objectionable features removed.

The **Dual Valve** is not in the same category as the fifty-seven varieties of the ordinary graduated supply valves, vacuum and vapor traps. Neither is it "just another trap."

The principle, construction, and improvement are such a radical departure from past and present appliances of a competitive nature that we will not grant that the **Dual Valve** is even a member of the trap family.

Analyze the principle and practicability and you will have ample evidence that it is a device that will actually perform the functions and duties for which it was manufactured in an economical and efficient manner and eliminate the present voluminous trap troubles.

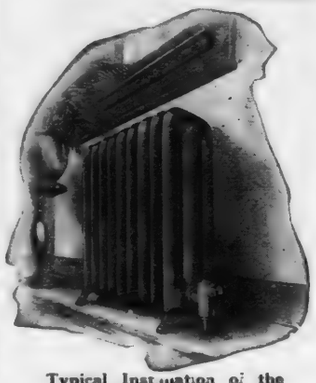
The **Dual Valve** is the result of years of thought, study and experimental work, to develop an appliance that would give the required degree of economy and efficiency and simultaneously eliminate the objectionable, troublesome and unsatisfactory apparatus in general use.

IT'S DIFFERENT
Make Us Prove It

DUAL VALVES FOR HIGH PRESSURE ARE ADAPTABLE FOR ALL DUTIES

The Dual Valve positively permits no steam to enter return pipe, due to the fact that when discharge valve is open, supply valve is automatically closed, and further, water seal is always present when discharge valve is open. In addition, ball valve in Dirt Pocket is a further factor of safety to assist in accomplishing this extremely essential necessity.

Free air exit at all times, regardless of the position of return valve. Irrespective of other methods of eliminating air that are incorporated in the Dual Valve, the hollow valve stem and corresponding restricted air vent in valve body permits the free exit of air at all times. This feature positively eliminates air bound conditions. High pressures and high vacuums can be applied simultaneously with Dual Valves.



Typical Installation of the Dual Valve.

READ THIS TRIAL TEST

"The proof of the pudding is in the eating:"— therefore, we suggest that you write immediately for a **Dual Valve,** subject it to every conceivable test, which will give you absolute evidence that the **Dual Valve** is as represented. After thirty days, if not entirely satisfied, return the valve to us at our expense.

GUARANTEE

We fully guarantee Dual Valves to give complete satisfaction

REPRESENTATIVES

Some good territory open. Write for complete details and descriptive literature

FEATURES INCORPORATED IN BOTH TYPES OF DUAL VALVES

The operation is controlled by CONDENSATION, A NATURAL ELEMENT. It is not dependent on questionable thermostatic members, controlled by temperatures; that collapse, crack, stick or otherwise do not function for various reasons The medium of control or power is a hollow, phosphor-bronze, non-collapsible, non-leakable float.

Provision has been made in the construction of the Dual Valve which eliminates any possible chance for the condensation to freeze. This feature will be appreciated when compared to float type traps.

The Dual Valve is dependable, reliable, continuous and positive in ection; is not dependent upon hairline sensitiveness and is the absolute elimination of all trap troubles.

SOME FACTS

A Few of the Many Desirable Features of the DUAL VALVE For Vacuum and Vapor Systems.

The Dual Valve connection to radiator is full size of radiator tapping, requiring no eccentric or other bushings. The Ball Float Valve in Dirt Pocket Chamber is lower than the bottom of the radiator. These and other features cause radiator to be kept entirely free of condensation at all times, if desired.

The Dual Valve replaces both the ordinary trap and graduated supply valve. The construction incorporates all desirable features of both edvices and eliminates the undesirable ones and gives the greatest degree of efficiency and economy.

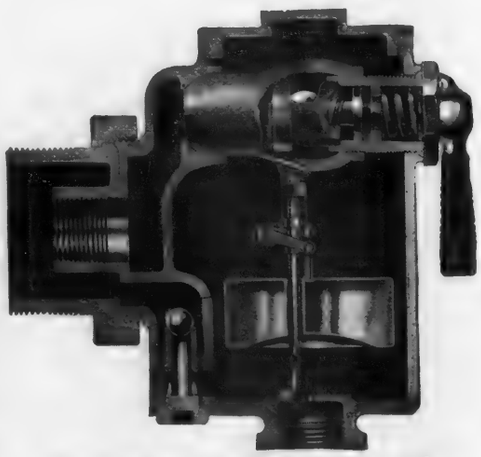
The Dual Valve has the same fractional control of radiator as exists with the most highly developed graduated supply valve.

This valve can be used purely as a trap, on Pipe Coils, Vento Heaters, and Drip Points.

The Dirt Pocket positively prevents scales or sediment from lodging on the seat of Float Valve located in Dirt Pocket or entering the Valve Body proper. The Clean-out Plug allows the ready removal of all accumulated sediment. This feature eliminates one of the most common causes of trap trouble and is not incorporated in any thermostatic type of trap.

Special tapping in spud or tail piece permits the use of steam type radiation, and the Dual Valve has but one connection to radiator. Both of these features tend to reduce the cost of installation considerably. The Dual Valve also permits alterations to radiator without disturbing pipe connections.

The Union Ell at Inlet of the Dual Valve, eliminates the necessity of straightway, right or left hand valves, as connection can be made from any angle.



Cross Section of the Vacuum, Vapor and Low Pressure Dual Valve.

HEATING & POWER APPLIANCE CO., Milwaukee, Wis.

The largest plant in the world devoted to the manufacture of thermostatic instruments

Sylphon Packless Graduated Valve No. 575

A single, easy, frictionless turn opens or closes valve. Rugged construction; finished workmanship. No packing. A Sylphon bellows surrounding the stem closes valve absolutely tight against leakage of air, steam or water, making it suitable for all vapor, steam and vacuum systems where permanent economy is desired.

"I knew you'd like this latest valve"

"IT'S the most up-to-date valve on the market, Mrs. Dodge, and absolutely the best I could buy," heating contractor Dawson explained.

"I like the appearance of it very much. Doesn't it open smoothly? Oh, that's much handier and quicker than twisting a squeaky, hot knob around. Besides, I see this dial shows exactly how far I open it. I suppose, though, it will leak after a year's use, as our old valves did."

"Madam, that valve will never leak. It's the packing in a valve that wears out and starts leaks. In place of packing, this valve has a Sylphon drawn metal bellows that expands and contracts like a spring as the valve is opened or closed. It makes the valve tight against air, steam or water leakage and will last a lifetime."

"The best of it is," said the heating contractor to himself, "Sylphon Packless Graduated Valves don't cost me any more than less efficient valves of this type. And I know *there* is another customer who will recommend my work to other owners, this year and for years to come."

The Heart of Sylphon Products

The wonderful Sylphon diaphragm or bellows replaces packing in the Sylphon Packless Graduated Radiator Valve. Made of one continuous piece of drawn metal, 2-ply laminated construction, this diaphragm has extreme flexibility and greatest possible strength. No solder to crack or leak. Invented and patented by W. M. Fulton and found only in genuine Sylphon specialties.

Sylphon
Heating Specialties

THE FULTON COMPANY, Knoxville, Tenn.

Hudson Terminal Building, 50 Church St., New York
Book Building, Washington Blvd., Detroit
Wrigley Building, 400 N. Michigan Ave., Chicago

Representatives in all the larger centers

THE FULTON COMPANY, DEPT. W, KNOXVILLE, TENN.

Check here if you wish information on other Sylphon Products.

- ☐ Temperature Regulators
- ☐ Damper Regulators
- ☐ Vent Valves
- ☐ Pressure Regulators

Please send me full particulars of the new Sylphon Packless Graduated Radiator Valves, without obligation.

.....

.....

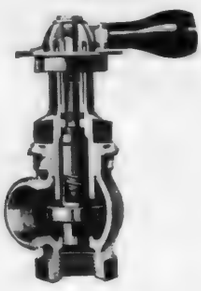
The

LAVIGNE

LINE OF

PACKLESS STEAM RADIATOR VALVES

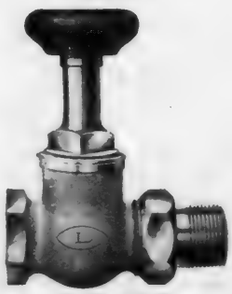
ALL



ALONG

DOWN

THE



LINE

*f*rom Architect and Engineer to contractor and fitter-all along the line—they laud the LAVIGNE VALVES for their simple and correct design, their efficiency, their economy and their adaptability to a wide range of sizes of radiators. And not only do the Architect, Engineer, Contractor and Fitter praise the LAVIGNE VALVES, but also the owner and user. There are several outstanding features that motivate this.

The Lavigne Packless Steam Radiator Valves have a bonnet which extends up under the handle. This protects the mechanism from injury. Being leak-proof there is a freedom from soiled and spoiled floors, ceilings and carpets. And being ***packless*** the trouble and constant worry of having to pack a valve is entirely eliminated.

Thus do the Lavigne Valves speak for themselves as well as their users speak for them.

Sold by All Good Jobbers

COMMONWEALTH BRASS CORPORATION

DETROIT MICHIGAN

NEW YORK
48 E. 41st Street

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332 So. Michigan Avenue

SAN FRANCISCO
68 Post Street

ANNOUNCEMENT

WALTER E BARNES — WILLIAM T JONES

BARNES & JONES

MODULATION, VAPOR AND VACUUM HEATING APPARATUS

REPRESENTATIVES IN PRINCIPAL CITIES

5 MELROSE ST., BOSTON, MASS.

NEW YORK OFFICE GRAND CENTRAL TERMINAL

April 1, 1922

ARCHITECTS, ENGINEERS and CONTRACTORS,
UNITED STATES and CANADA.

Gentlemen:

BARNES & JONES announce that on and after April 1. 1922, they will not represent in any way the Thermograde Valve Co. or its products.

After April 1st, BARNES & JONES will manufacture and sell a complete line of their own design of all appliances necessary to the successful operation of Vapor and Vacuum Systems of Heating.

These appliances will be marketed under the trade name of BARNES & JONES and will include Modulation Valves, Thermostatic Return and Drip Valves, the Barnes & Jones Condensator, for returning the water of condensation to the boiler under varying pressure conditions, and such auxiliary apparatus as is required to insure correct results.

Walter E. Barnes was the President and Treasurer of the Thermograde Valve Co., and since its formation in February 1902 its active manager.

William T. Jones was connected with the Thermograde Valve Co. in the engineering and sales departments since 1912. During the latter part of this period he was the New England Sales Representative, in which position he acquired an intensive engineering knowledge of present day methods of heating.

The experience acquired by Messrs. Barnes and Jones during their many years of service will be embodied to the fullest extent in the apparatus they are now marketing commercially. And, additionally, with every piece of apparatus sold and to every installation, will go that service and co-operation, and attention to details, that has proven so satisfactory in the past to the clients of the Thermograde Valve Co.

Messrs. Barnes and Jones bespeak from their friends and acquaintances a continuance of that consideration and courtesy that has so generously been extended to them heretofore.

Yours truly,

BARNES & JONES

BY Walter E. Barnes

WEB.EH

SPECIFY

BARNES & JONES

"O-E Perfect Packless Graduated Valve. Placed at top of Radiator. Quick opening. Never sticks. Tested by Air and Water tests.

Simplicity in a Heating System Is Twin Brother to Common Sense

The basic principle of the "O-E" Perfect Vapor-Vacuum-Pressure Heating System is simplicity. There are no floats, return traps, pumps, diaphragms or other complicated parts to get out of order. Eliminates automatic air valves.

Three Systems in One

Vacuum most of the time, Vapor part of the time, Pressure when desired. A great coal-saver. Always holds steady water line. Most adaptable, flexible and efficient of any. Noiseless in operation. Practically fool-proof. No expert attention needed.

"O-E" Perfect Air Exhauster and Vacuum Valve, with new Hollow Bronze Ball. Always works. Never sticks. Carefully tested.

The "O-E" System costs less to install and gives your customer better service than either vapor or water. Is easier to install right than wrong.

Before deciding on the heating equipment for your next job, investigate the "O-E" Perfect System. It will save you labor and material costs, unprofitable call-backs for adjustments and repairs, and our guarantee furnished with each installation fully protects you

"O-E" Perfect Ball Check Water Seal Return Fitting, with Air Vent and Clean Out. Each Fitting carefully tested.

Write for Booklet "A"

O-E SPECIALITY MANUFACTURING CO.

882 THIRD ST., MILWAUKEE, WIS., U. S. A.

A Super-Regulator for Vapor Heating Work

POWER IS ITS MIDDLE NAME

Draft dampers are controlled with strong and steady graduated movement, accurately responsive to slightest change in boiler pressure, even to the fraction of an ounce.

A vapor or modulating system has a new meaning when hooked to the boiler with a

Wiley Safety Vent Vapor Regulator

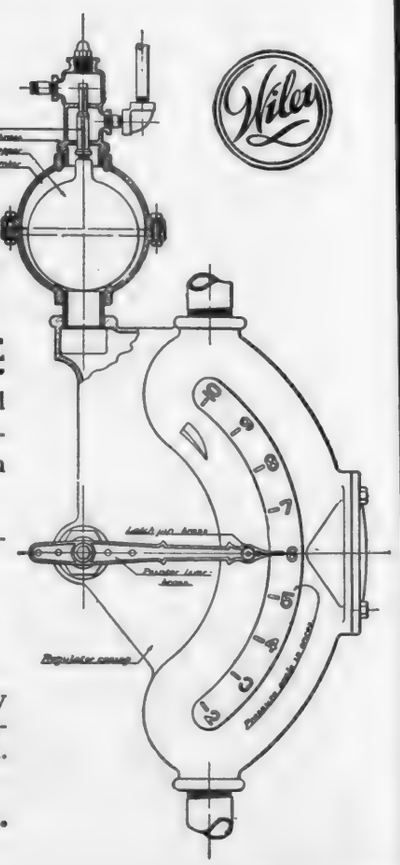
built for lifetime service

All working parts of cast bronze, accurately machined. Safety-Vent-Valve forms part of regulator and handles air from entire heating system.

Write for prices and full information

SIMPLEX HEATING SPECIALTY COMPANY, Inc.

LYNCHBURG, VA.



SERVICE QUALITY

The B & B Line

B & B Multiflex Pneumatic Supply Valve All Metal

CONTROL THE HEAT SAVE THE FUEL

THE BISHOP & BABCOCK line of HEATING SPECIALTIES consists of a specialty to meet every Heating requirement. They have been installed in thousands of buildings and have proven their quality and services. By the installation of either a Bishop & Babcock Temperature Control System or Bishop & Babcock Vacuum System, a great saving in fuel is guaranteed.

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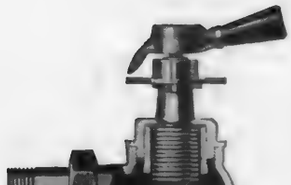
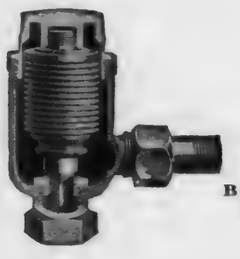


B & B Multiflex Modulation Valve for Supplying Steam or Vapor to the Radiator All Metal

THE BISHOP & BABCOCK COMPANY

General Offices and Factories, CLEVELAND, OHIO



B & B Multiflex Trap for Return End of Radiators and Drip Points All Metal

WORLD'S MOST COMPLETE HEATING SPECIALTIES LINE

A Webster System of Steam Heating in the Cleveland Public Auditorium

The Webster

SYSTEMS OF STEAM HEATING

WARREN WEBSTER & CO.
Camden, N. J.

35 Branch Offices
Canada: Darling Bros., Ltd., Montreal

The new Cleveland Public Hall, the largest of its type, was designed throughout to set a standard of efficiency and comfort. Only equipment that experience had proven to be the best of its kind was used, and the selection of a Webster System of Steam Heating was therefore most logical.

In choosing Webster heating equipment, the architect and consulting engineers were justified by the results of over 17,000 successful installations, and knew they could depend on the Webster experience of 33 years as leaders in the development of steam heating systems to help provide an installation that would exactly meet requirements.

Send for Bulletins of Webster Heating Systems.

VAPOR MOUAT HEAT

THE MOUAT
Vapor Heating System

Complete circulation at a pressure of 1¾ ounces

Brotherhood of
Railway Trainmen Building
CLEVELAND, OHIO

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***The* MOUAT-SQUIRES CO.**
Cleveland, Ohio

VAPOR MOUAT HEAT

At Last!

A SINGLE PIPE VAPOR SYSTEM

Simple to install
Efficient in operation
Low in cost

Descriptive matter sent on request

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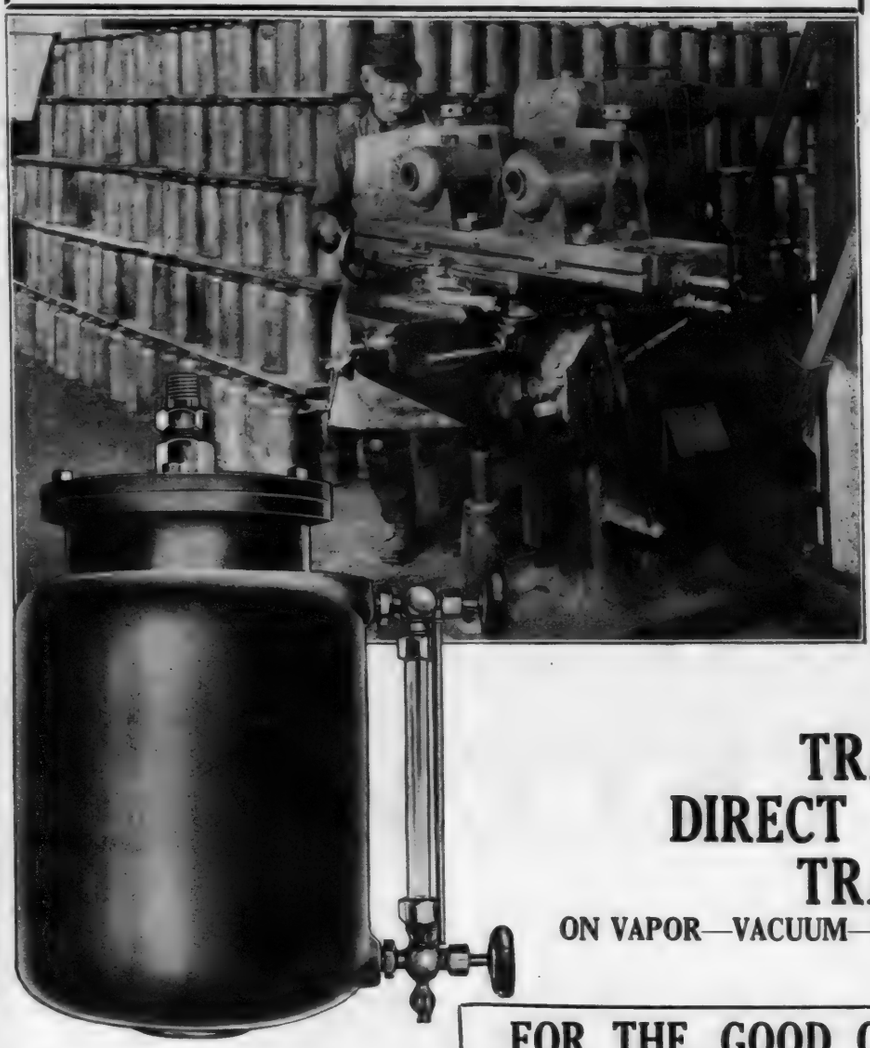
FOR SAFETY'S SAKE



TRANE

Engineers and heating contractors have long realized that vapor heating systems, or any system of heating where the radiators are equipped with thermostatic traps for gravity installations, require some positive means of forcing the return water back to the boiler during those periods when the difference in pressure between the boiler and the return pipe is such as to prevent the return of the condensation by gravity.

The photo reproduced here, taken May 1, 1922, illustrates the popularity of The Trane Company's problem.

TRANE DIRECT RETURN TRAPS

ON VAPOR—VACUUM—STRAIGHT STEAM JOBS

FOR THE GOOD OF THE SYSTEM

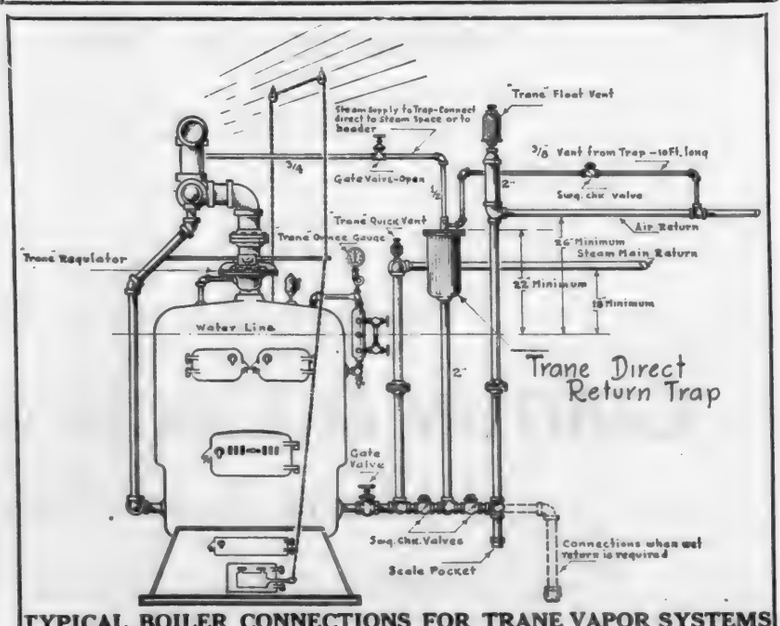
Broken boilers and Trane Direct Return Traps are never found on the same system. This trap returns water to the boiler of the heating system, direct. Safety First necessity where piping is near water line of boiler, or wherever radiator traps are used. Standard equipment for The Trane System of Vapor Heating. Has many other uses.

Write for Bulletin 7

The Trane Company

La Crosse, Wis.

206 Cameron Avenue



TYPICAL BOILER CONNECTIONS FOR TRANE VAPOR SYSTEMS

"Hello Andy

I suppose that's the profit on your latest heating contract"

"You sure guessed right, Bill, and I'm going to land another contract this afternoon. Since I've made a specialty of installing Moline Heat, my business has grown like the mischief, and, what's more, I'm certain of a definite profit on every job. There are no 'come backs' to pile up expenses on me.

"My very first Moline Heat job was in this very building, and I guess you know how well that is working."

"You bet I do, Andy; and on the strength of that job we've boosted you ever since. More power to you and Moline Heat."

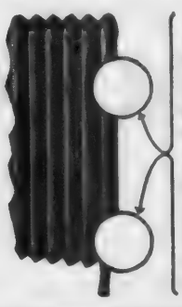
If you, Mr. Contractor, are struggling against odds to make a profit on your business, you'd better look into Moline-Heat. Here is a heating system that will pay you a profit because you run against no unexpected snags. You can figure your profit the minute you get your contract signed.

Moline Heat works with the laws of Nature, not against them, as so many other systems do. You do not have troublesome thermostatic traps or "get out of order cure-all" contrivances to eat up your profits. While traps, vents, etc., are all right in their place, you do not need them with Moline Heat. The construction details furnished as a part of every Moline Heat job enables you to install the system so perfectly that it needs no aids to perfect steam circulation.

Send in the plans of your next prospect and get the Moline proposition on that particular job. Study it and then submit it to your prospect and see what happens.

If you don't bank a profit on the job you will be different than the other contractors who are cashing in on Moline Heat installations.

These contractors put "Moline Heat Everywhere" on the map. We are grateful to them, and do all in our power to help them swell their bank accounts. Write The Herman Nelson Corporation, Dept. H2, Moline, Illinois.



MOLINE Heat Simple Equipment, combined with Moline Heat Scientific Method of Steam Circulation and Piping Design, eliminates the necessity of using Automatic Air-Vents, Automatic Radiator Return Traps or Vacuum Pumps of Any Kind on 90% of all heating problems

Heatovent
(REG · U·S·PAT · OFF·)

UNIT HEATING AND VENTILATING SYSTEM

The Unit System is the latest Heating and Ventilating System for Banks, Clubs, Schools, Offices, Churches, Lodges, etc.

The Heatovent is the ideal Unit Heater, as it incorporates all of the best engineering principles and designs.

It is of simple artistic design, finished to harmonize with any interior.

It insures perfect ventilation at all times, free from any drafts.

Simple in construction and silent in operation, the Heatovent is always ready to serve you. It starts by pressing a button—it stops the same way.

The Cabinet encloses a special new style Steam Coil designed to give the highest possible heat transfer at low air velocity; it, also, encloses a pair of special slow speed Multi-blade Fan Wheels direct-connected to a specially designed electric motor built to our specifications.

All of these special built features make the Heatovent the quietest and most economical Unit Heater now being manufactured.

The fresh air is drawn into the cabinet, tempered to proper degree, and then diffused into the room thru louvres near the top of the cabinet.

Our Engineering and Service Departments are ready to assist or cooperate with any Engineer or Architect by furnishing proper data and information for designing the Unit system for Banks, Offices, Clubs, Lodges, Schools, Churches, Auditoriums, Gymnasiums, etc., without any obligation.

WE ARE FURNISHING PROPER VENTILATION, NOT MERELY SO MUCH EQUIPMENT
BUCKEYE EQUIPMENT MEANS HIGHEST QUALITY AND SERVICE AT ALL TIMES

We still have some open territory for a few high grade selling organizations

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COLUMBUS, OHIO

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An invaluable aid to you is our completely equipped Air Conditioning Laboratory where the problems your client faces in manufacturing his product can be reproduced and solved by men experienced in interpreting the results of such tests.

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You can reproduce conditions and make tests in this laboratory and you have the service of engineers experienced in this highly specialized branch of engineering to interpret the results of your tests.

Make use of these facilities. They are being used by many consulting engineers and can be of Real Service to you.

Full information and catalogue covering all phases of air conditioning work, can be obtained by requesting a personal call from one of our engineers or by correspondence.

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PUTS AIR TO WORK

W. L. FLEISHER & CO., Inc.
New York City
Design and install all Sturtevant-Fleisher Air Conditioning Systems.

ALLEN AIR-TURBINE VENTILATOR

Standard of Ventilating Efficiency

Wherever ventilation is desired—in factories, foundries, stores, schools, hotels, churches, theatres, residences, kitchens, bakeries, tanneries, barns, stables, garages, chimneys, air shafts, or wherever air circulation is required, Allen Air-Turbines *have proven the best, cheapest and most efficient* ventilating system known.

Many of America's largest architects, engineers and industrial concerns have adopted and endorse Allen Air-Turbine Ventilators.

Patented

Our air displacement is measurable and the figures given are guaranteed to be correct.

Diameter of Pipe	Air Displacement Cu. Ft. per Hour	
	Wind Velocity 4 Miles per Hour	Wind Velocity 8 Miles per Hour
8 Inches	17,300	21,600
10 "	26,500	32,500
12 "	38,600	46,200
15 "	54,000	69,000
18 "	85,200	102,100
20 "	105,100	125,600
24 "	149,000	185,000
30 "	225,000	272,000
36 "	281,000	330,000
42 "	324,000	414,000
48 "	360,000	473,000

CARRIES OFF
GASES
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HEAT
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ALLEN AIR-TURBINE VENTILATOR CO.
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TRADE TEL TRU MARK

MEASURING AIR FLOW

is no longer a difficult, tedious and inaccurate operation.

THE KOPNAREIMETER (SMOKE-AIR METER) has solved the problem.

Low velocities that will not move the vane of the anemometer or show on the slant gauge are determined with ease with the Kopnareimeter, High velocities offer no difficulties. No moving parts, cannot get out of order, never needs recaliberation, accuracy guaranteed, fits the vest pocket.

Kopnareimeter in Use

Thermometers, Psychrometers, Cotometers, Healthometers, and other air testing instruments.

Write for further information and for a copy of our easy reading Psychrometric Chart and Comfort Chart. Free for the asking.

TEL TRU

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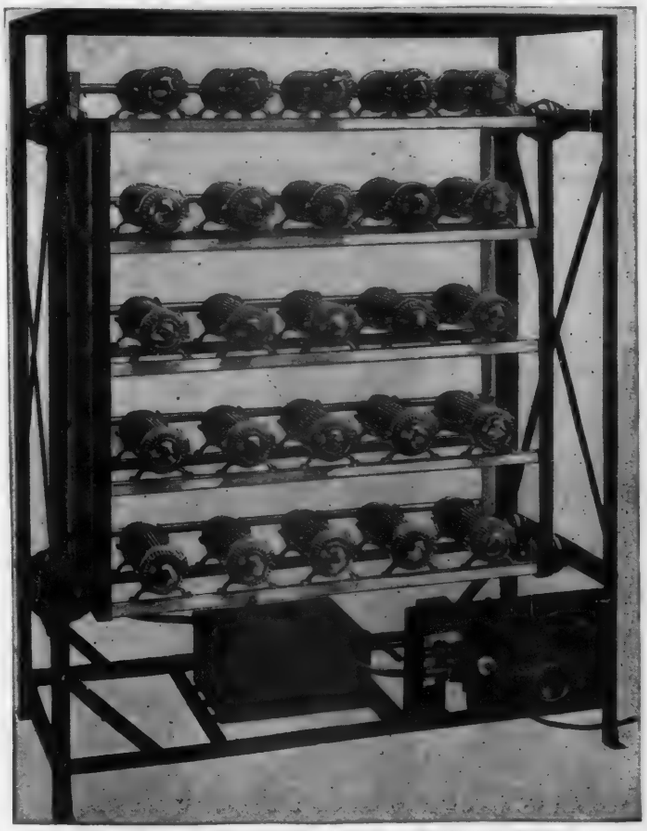
AEROLOGISTS
64 West Randolph St., Chicago, Ill., U. S. A.

TEL TRU

IDEAL AIR CONDITIONS FOR THE NATION'S CAPITOL



A 25-unit Ozone Pure Arifier that on the basis of 10c per kw. hr. will run 10 hrs. at the cost of 12c ozoning 25000 cu. ft. of air per minute.

Two Ozone Pure Arifier equipments, 100 cylinder units of the type shown here, are successfully operating in our Capitol in connection with the mechanical ventilating system.

These units ozonize 40,000 cu. ft. of air per minute for the Senate and 60,000 cu. ft. of air per minute for the House of Representatives, giving our legislators a pure, fresh and invigorating atmosphere in which to conduct the affairs of the nation.

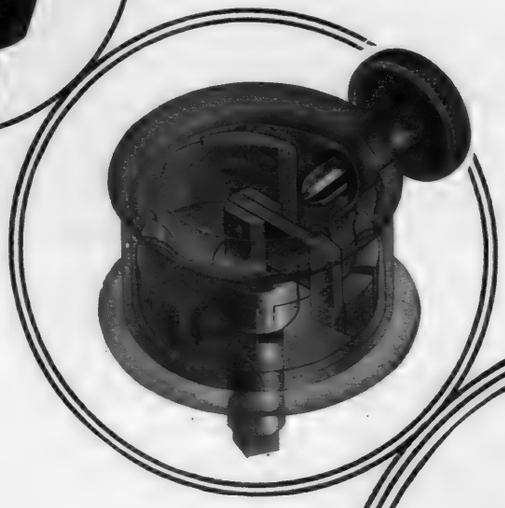
Ozonization is the latest scientific method of insuring fresh air and the Ozone Pure Arifier is the latest scientific device. These arifiers are made in any size desired to meet exact requirements, and from the Nation's Capitol to the Home, the Ozone Pure Arifier is daily affording healthful ventilation, efficiently, scientifically and economically.

Our latest bulletin entitled "Nature at Her Best" will give you some very interesting facts about Ozone that you as an Architect, Engineer or Contractor should be familiar with. Send for it.

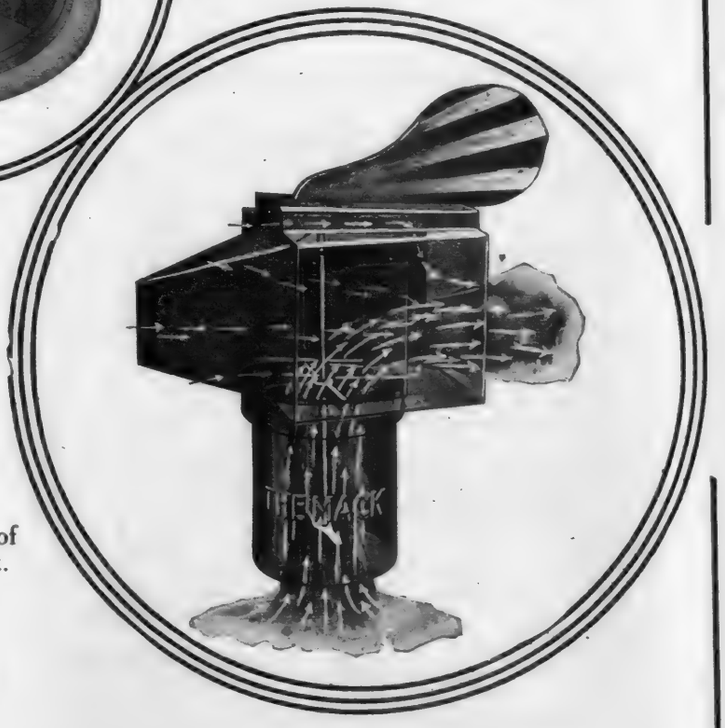
OZONE PURE ARIFIER COMPANY
Chicago, Illinois

"All Good Things Are Three"

1. Airomatic. "A ventilator without a storm band, yet absolutely weather and down draft proof. Note generous openings. Ventilates in any wind, straight across, up or down. Rigidity assured. All edges are wired.



2. The Perfecto. A combined damper-lock, regulator and indicator. Regulates and controls incoming tempered air and exhaust of vitiated air. Locks that control. Indicates position of damper. Designates rooms to which ducts are directed. Made of stamped steel, any desired finish.



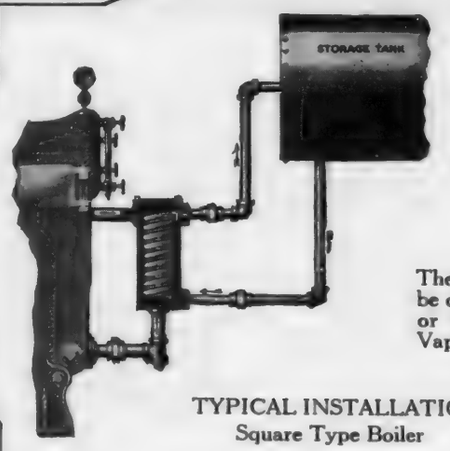
3. Mack Ejector. "A ventilator that uses its head," always operative, utilizing low velocity wind pressure. Inverted bronze bushing working in steel bearing, and individual balancing, assure silent ease of motion and positively prevent down-draft. Substantially built and all edges are wired.

All 3 Are Good

Manufactured by

The Stark Sheet Metal Works Co.

Rex and Second Sts., S. E. **Canton, Ohio**



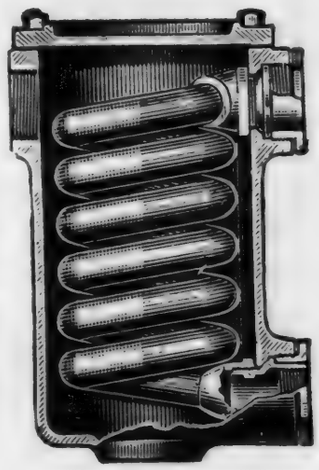
The Excelso Heater may be connected to any type or make of steam or Vapor Heating Boiler.

TYPICAL INSTALLATION
Square Type Boiler

Mr. Geo. P. Mitchell,
E. Orange, N. J.

"The Excelso Heater which you recently installed in connection with the steam furnace, is entirely satisfactory. I have all the supply of hot water I need at any time. It really seems wonderful that such a small affair can be so efficient. I can heartily endorse it and beg to remain

Very truly yours,
Allen Chamberlin"



SECTIONAL VIEW

In specifying Excelso you are giving your customer an *Economical Water Heater*

that guarantees a *constant supply* of *hot water* at *lowest possible cost*. Connects on outside of any steam or vapor heating boiler. Requires no attention. Does away with fire-pot coils.

PATENTED GROUND JOINTS
eliminate annoying leaks

Excelso is endorsed and sold by all the leading Boiler Manufacturers.

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Richardson & Boynton Co.	International Heater Co.
Richmond Radiator Co.	Boynton Furnace Co.
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Utica Heater Co.	Gurney Heater Mfg. Co.
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Monitor Bi-Loop Radiator Co.

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Money Back Guarantee

EXCELSO

Write for particulars, prices, discounts, etc.

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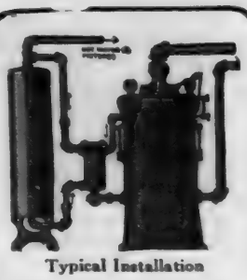
Special New York Sales Representative, John G. Kelly, 137 East 43rd Street.
New England Representative, Daniel L. Hanson, 46 Cornhill, Boston, Mass.



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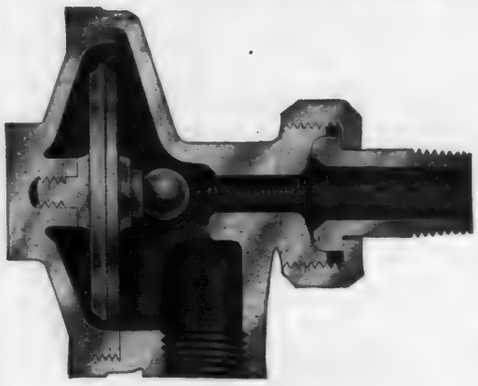
Have been successfully installed in thousands of buildings—
A RECORD OF 20 YEARS OF SUCCESS



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THESE
ILLINOIS VALVES
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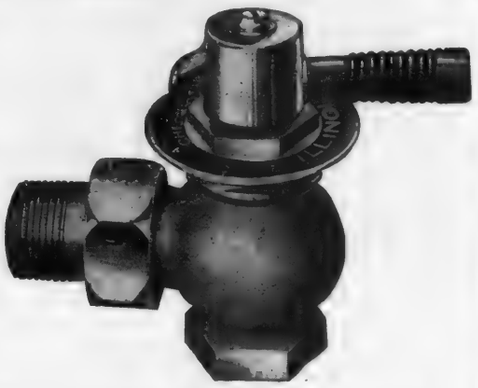

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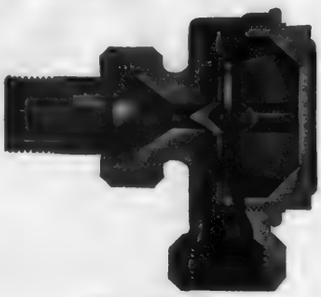

No. 28 Trap

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CHICAGO

The Heating and Ventilating Magazine

VOL. XIX. NO. 6

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A MONTHLY JOURNAL OF ENGINEERING PROGRESS

JUNE, 1922

NEW METHOD PROPOSED OF ARRIVING AT HEAT LOSSES DUE TO WIND

A Suggestion Based on Weather Bureau Records of Wind Velocities and Directions During Cold Spells

BY H. M. HART.

SEVERAL papers have been presented before the American Society of Heating and Ventilating Engineers on the effects of wind on the heating load. In one paper, by H. W. Whitten, printed in the 1916 Transactions (page 195) he gives the following coefficients, based on one mile per hour wind velocity:

50°	to 40° F.	equals	0.75° F. drop in temperature.
40°	to 30° F.	equals	1.0° F. drop in temperature.
30°	to 20° F.	equals	1.1° F. drop in temperature.
20°	to 10° F.	equals	1.2° F. drop in temperature.
10°	to 0° F.	equals	1.3° F. drop in temperature.
0°	to —10° F.	equals	1.4° F. drop in temperature.
—10°	to —20° F.	equals	1.5° F. drop in temperature.

In the same volume of the Transactions, page 507, is an article on heat loss through glass, by Professor Allen, in which he finds the value of K equals approximately 0.64 for outside temperature of 50° F. and inside temperature of 125° F. with no wind or rain, and a value for K of 1.05 under about the same temperatures, but with a 37-mile per hour wind with no rain. This would indicate that one mile per hour wind at 75° difference in temperature would be equivalent to $\frac{(1.05 \times 75) - (0.64 \times 75)}{0.64 \times 37} = 1.35°$ drop in temperature.

WIND DATA DURING COLD SPELLS.

In order to determine what effect this theory would have on the design of a heating system, the writer secured from the U. S. Weather Bureau in Chicago, all the temperatures recorded at 20° or below, for a period of three years, together with the wind velocity and direction. Temperatures are recorded every hour. These temperatures and wind velocities were then reduced to equivalent temperatures, with no wind, on the basis of one-mile wind velocity being equivalent to one degree drop in temperature (see chart). Out of a total of 17,196 hours of heating season for three years, there was only a total of 1464 hours that would be equivalent to 0° or below on the above basis, divided as follows:

North	11 hours.
N. E.	52 hours.
East	5 hours.
S. E.	3 hours.
South	73 hours.
S. W.	199 hours.
West	616 hours.
N. W.	505 hours.
	1464 hours.

This clearly establishes the points of compass of the prevailing coldest winds. By referring to the chart, it would seem that we could readily establish factors to be added to the various points of the compass to take care of the peak heating loads. However, we still have to deal with unknown factors, because the north exposure will undoubtedly be affected by the northwest winds, as will the south exposure by the southwest winds, etc. The north exposure, while being subjected to only 11 hours of zero, equivalent or below, would, however, be affected by the northwest winds.

—5° would be a reasonable maximum for direct north exposure. For northwest exposure, —25° would seem sufficient for maximum load. So, for northwest, one-half the difference is assumed between —25° + —5°, or —15° for maximum load.

Outside temperature equivalents of zero or below based on one mile per hr. wind being equivalent to one degree difference in temperature from Oct. 1-1915 to June 1-1918 Chicago Illinois.

TEMP.	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30	-31	-32	-33	-34	-35	-36	-37	-38	-39	-40	-41	-42	-43	-44	-45	-46	-47	-48	-49	TOTAL
N		1	2	4	1		1	1	1																																										11
NE	1	5	4	3	6	4	1	3	4	3	3	3	2	2	2	1	2			2	1																																52
E		1				1			2	1																																										5
SE	1	1										1																																									3
S	8	13	9	11	8	3	2	5	3	2	5	2	2	2																																						73
SW	20	19	16	19	18	7	10	9	8	8	8	10	9	6	7	3	2	2	2		2		2	1		1		1							1							1				2	2	1		2	199
W	24	33	35	33	43	26	34	25	26	27	29	35	31	26	29	22	12	9	9	6	16	11	6	9	9	13	3	6	6	3	5	1	2		1	1						1								616
NW	34	46	47	32	32	31	31	31	30	23	21	21	22	19	14	8	13	10	7	8	6	5	1	1	3	2					1	1	3																	505
TOTAL	88	119	113	102	109	82	79	74	74	64	66	72	66	55	52	34	29	21	18	16	24	16	9	11	12	17	3	7	6	3	6	2	5		1	1					1				1	2	2	1		2	1464

Note—Figures given are the number of hourly readings.

For west and southwest exposure, it would seem that we would have to figure on a basis of about —30° for maximum conditions. For south, half the difference between —30° + 10°, or —20°. For southwest, half the difference between —10° + zero, or —5°. For east, which would be affected by the northeast winds, half the difference between —15° and zero, or —8°. For northeast winds —15°.

Our factors to be added for the various points of compass would, therefore, be as follows:

	—10°	to 70° =	80° raise =	100%
North	—15°	to 70° =	85° raise =	106.75%
N. W.	—25°	to 70° =	95° raise =	118.75%
West	—30°	to 70° =	100° raise =	125%
S. W.	—30°	to 70° =	100° raise =	125%
South	—20°	to 70° =	90° raise =	112½%
S. E.	— 5°	to 70° =	75° raise =	94%
East	— 8°	to 70° =	78° raise =	97.5%
N. E.	—15°	to 70° =	85° raise =	106.75%

From the above table, it would seem that we could group the factors to be added for different points of the compass about as follows, where heat loss is based on 70° difference in temperature:

To east and southeast exposure deduct 5%.
To south, north and northeast add 5%.
To northwest, west and southwest add 25%.

Of course, in using this theory of heat distribution, it would be necessary to make similar charts for different parts of the country, inasmuch as prevailing winds might be different.

The Generation of Steam by Electricity.

Interesting possibilities in connection with the generation of steam by electricity are presented in a paper by F. T. Kaelin, chief engineer of the Shawinigan Water and Power Company, presented at a joint meeting of the Montreal Section of the Chemical Industry, the Engineering Institute of Canada and the Canadian Institute of Mining and Metallurgy. The paper in full is published in the *Journal* of the Engineering Institute of Canada for March, 1922.

While no attempt is made to justify the general adoption of this practice, the claim is made that there are numerous instances where some remarkable results are being obtained in connection with large hydro-electric plants, when the steam load is used for some industrial purpose at a period when the electric load would not otherwise be utilized. Efficiencies of conversion are reported as high as 98%.

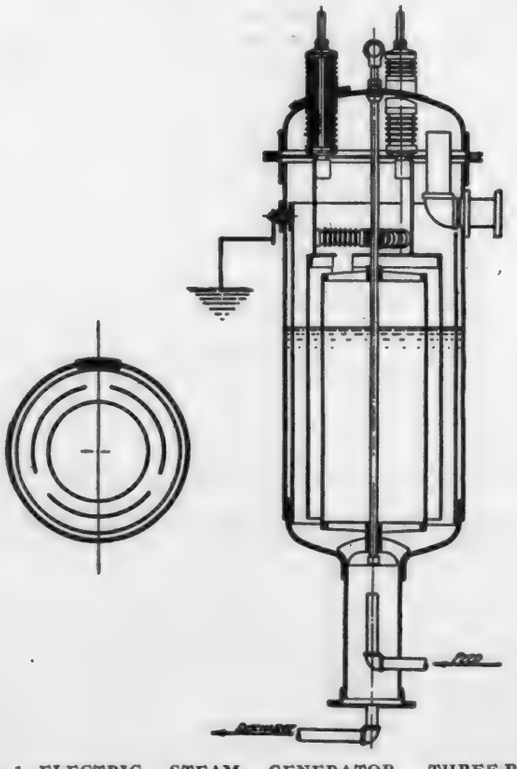


FIG. 1. ELECTRIC STEAM GENERATOR, THREE-PHASE SINGLE UNIT SYSTEM.

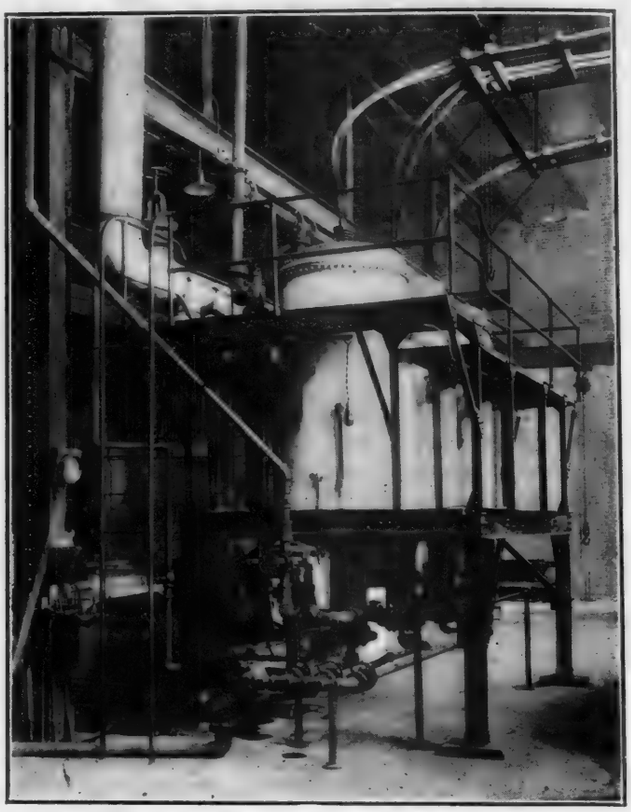


FIG. 2. 1800 KW. STEAM GENERATOR, 6600 VOLTS, THREE-PHASE, 130 LBS. PRESSURE.

In some of the installations shown 1 boiler horse-power is being produced at the expenditure of approximately 10 K. W. Taking as a basis 8 lbs. of water evaporated per pound of coal, this would mean that 4.3 lbs. of coal would be required to do the same work as would be done by 10 K. W.

From the ordinary economic standpoint, this would, of course, bar the use of electricity as a boiler fuel, because with steam coal at $10.00 per ton or ½-cent per pound, electrical energy, to compete with coal, would have to be sold at a rate under ¼-cent per kilowatt-hour.

The striking feature of the scheme, especially to those accustomed to boilers fired with coal or oil, is the extraordinary compactness and low first cost of the boiler installation. In Fig. 1, is shown a typical electric steam generator for 1300 amperes, 2200 volts, 3-phase, 60-cycle, for a working pressure of 165 lbs. per square inch. The electric current passes through from both sides of the electrode to the inside and outside cylinders, and to a much smaller amount directly from electrode to electrode.

An 1800 K. W. steam generator consisting of three units such as those shown in Figure 2, requires a floor space of only 12 ft. x 22 ft., the dimensions of the main boiler shell excluding the water leg being 42 in. x 70 in. From the illustration it will be noted that the generator is of the direct contact water-resistance type and the current is used at line pressure as high as 6600 volts. The required headroom is 25 ft. The boiler room force, with this equipment, is smaller than with any other type of steam generator, one man only being needed for the largest plants.

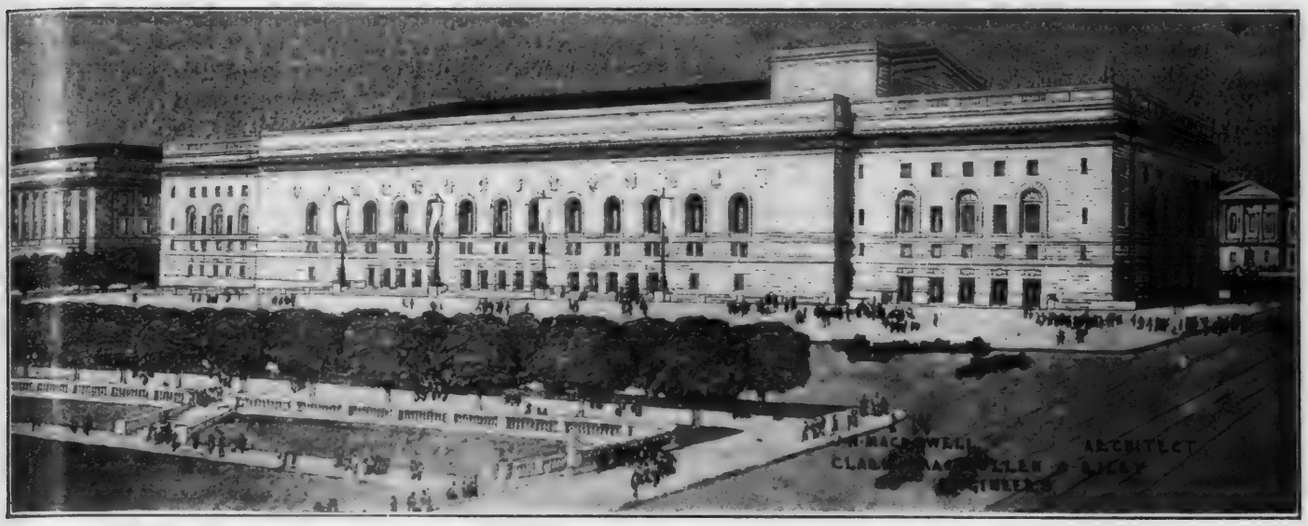


FIG. 1.—THE CLEVELAND PUBLIC HALL, CLEVELAND, O.

VENTILATING EQUIPMENT OF CLEVELAND'S PUBLIC AUDITORIUM

Methods Followed in Handling the Air Supply for the Largest Plastered Structure in the World

BY M. A. BOYD,

Cleveland Representative, Clark, MacMullen and Riley.

THE Cleveland Public Hall, just opened, has been built by the citizens of Cleveland to accommodate political, educational and business conventions, exhibitions of all kinds. opera, a three-ring circus, or any function in which a large number of people are interested and would attend.

The building is 369 ft. long, 213 ft. wide and 150 ft. high. The basement contains a large exhibition hall, apparatus and storage rooms, and the rest of the building is assigned to the stage, with organ, property, dressing and utility rooms at one end. The main auditorium, with committee rooms and offices, occupies the remainder of the building.

The auditorium has a seating capacity of 12,500 people, and is reported to be the largest plastered structure in the world.

LARGE AMOUNT OF OPEN SPACE NECESSITATES SPECIAL LOCATION OF UNITS.

Because of the large volume of open space in the building, viz., exhibition hall, stage and auditorium and the large amount of storage, stairway, ramp and corridor space, it was necessary to locate the main ventilating units, including heaters and air washers, in the attic space above the auditorium. Even this space is occupied, to a large extent, by a lamp chamber built to enclose the overhead indirect lighting fixtures; these lights shine through a series of glass panels in the ceiling of the auditorium.

FIVE SEPARATE VENTILATING SYSTEMS.

Several separate ventilating systems have been used as follows:

(A) Auditorium, including four multiblade supply fans, each having a capacity of 75,000 cu. ft. of air per minute and six exhaust fans, four of the multiblade type, each rated at 75,000 cu. ft. of air per minute, and two of the disc type, each rated at 75,000 cu. ft. of air per minute.

(B) General supply and exhaust system, including two supply and two exhaust fans, all of the multiblade type, and each rated at 72,000 cu. ft. of air per minute.

(C) Stage end supply and exhaust system, one supply and one exhaust multiblade fan, each rated at 22,000 cu. ft. of air per minute.

(D) Committee room exhaust system, one fan rated at 6500 cu. ft. of air per minute.

(E) Toilet exhaust system including three separate units having a total capacity of 13,000 cu. ft. of air per minute.

The large supply and exhaust units for the auditorium are of the double-width double-inlet type.

ENTIRE AIR SUPPLY WASHED.

All fresh air furnished to the building passes through air washers. There are four air washers in the attic space in connection with the auditorium supply system, two air washers located in the basement for the general supply system, and one on the basement mezzanine floor for the stage end supply system.

PROVISION FOR DOWNWARD OR UPWARD VENTILATION.

The ventilating system for the auditorium has been designed and installed so that it can be operated as a "downward" or an "upward" ventilating system. The normal method of operation, during the heating season, is "downward" and when operating in this fashion the air can be delivered through grilles in the ceiling around the outside walls and end of the auditorium. This air can be shifted, by pneumatic switch control, to a series of grilles in the ceiling, located about 48 ft. from the side walls. Provision for changing the point of delivery was made to make it possible to deliver the full volume of tempered air into the auditorium without overheating the people in the upper rows of the balcony. By a graduated pneumatic switch it is possible to deliver part of the air to the outside grilles and part to the center grilles or all the air at either point as required.

Air is withdrawn from the auditorium, under the normal condition of operation, from the face of the balcony at the second

floor level, and from points underneath the balcony at the first floor ceiling level. These points are indicated on the cross section (Fig. 6).

OPERATION OF SYSTEM DURING SUMMER MONTHS.

During the summer months the system will be reversed so that the fresh air is delivered near the floor and the vitiated air withdrawn at the ceiling of the auditorium. Thus the natural movement of the air will assist the mechanical movement. Under these conditions the air will be exhausted by the four multiblade exhaust fans from the grilles at the outside walls, and end of the auditorium. During very hot weather the two summer exhaust fans can be operated and they will take air from the summer exhaust grilles only.

The four multiblade type auditorium exhaust fans discharge into the lamp chamber. The object of this is to keep the lamp chamber at a reasonable temperature during very hot weather so that it will be possible for mechanics to work in this space while the auditorium is in use.

PROVISION FOR RECIRCULATION OF AIR IN AUDITORIUM.

It will be noted from the drawings that provision has been made for recirculating the air in the auditorium. The object of this is to cut the cost of heating this space to a minimum during those times when ventilation is not required.

Considering the southwest supply and exhaust unit for the auditorium, the normal operation would call for the fresh air damper "R" to be open, the shut-off damper "Q" open, the recirculating dampers "S" and "T" closed. Thus fresh air is being drawn into the air washer and vitiated air is coming up the air shaft in the corner of the building. This air passes into the large duct above the air washer and into the switch chamber.

In this chamber dampers "O" and "M" would be closed, and dampers "N" and "P" would be open. Thus the supply fan would be discharging straight through the switch chamber into the double duct just beyond same. In this duct damper "L" would be open and damper "K" closed, allowing the air to enter the duct connecting to grilles at the outside walls.

By closing damper "L" and opening damper "K" it would be possible to supply air to the summer exhaust grilles, in other words, move it away from the outside walls towards the center of the auditorium.

If this unit were now reversed in order to make an "upward" system, the only change required in the damper setting would be in the switch chamber in which case dampers "N" and "P" would be closed and dampers "M" and "O" would be open. This would cause the supply fan to discharge air into the right-hand portion of the switch chamber, thence into the large flat duct above the air washer and down the masonry air shaft to the first and second-floor levels in the auditorium. This air passes through underground ducts below the basement before flowing into the auditorium.

Should it be necessary to use the summer exhaust fan, the system would have to be set for "upward" ventilation, damper "K" to be closed, damper "G" closed, damper "I" open, damper "J" open. Thus the disc fan would draw air from the eight special grilles near the center of the room and the supply fan would discharge through the grilles at the outside wall.

If this unit is to be set for the recirculating position, dampers "R," "Q," "M," "O," and "K" would be closed and dampers "S," "T," "P" and "L" would be open. Under this scheme the exhaust fan would not be operated.

The southeast unit is exactly similar to the southwest unit except that it is the opposite hand.

ARRANGEMENT OF NORTHEAST AND NORTHWEST UNITS.

On account of structural conditions the northeast and northwest units are arranged in a different manner from the other two. Considering the northwest unit under normal operation, and referring to the attic plan and cross section looking north,

FIG. 2.—VIEW OF AUDITORIUM, CLEVELAND PUBLIC HALL, LOOKING FROM STAGE.

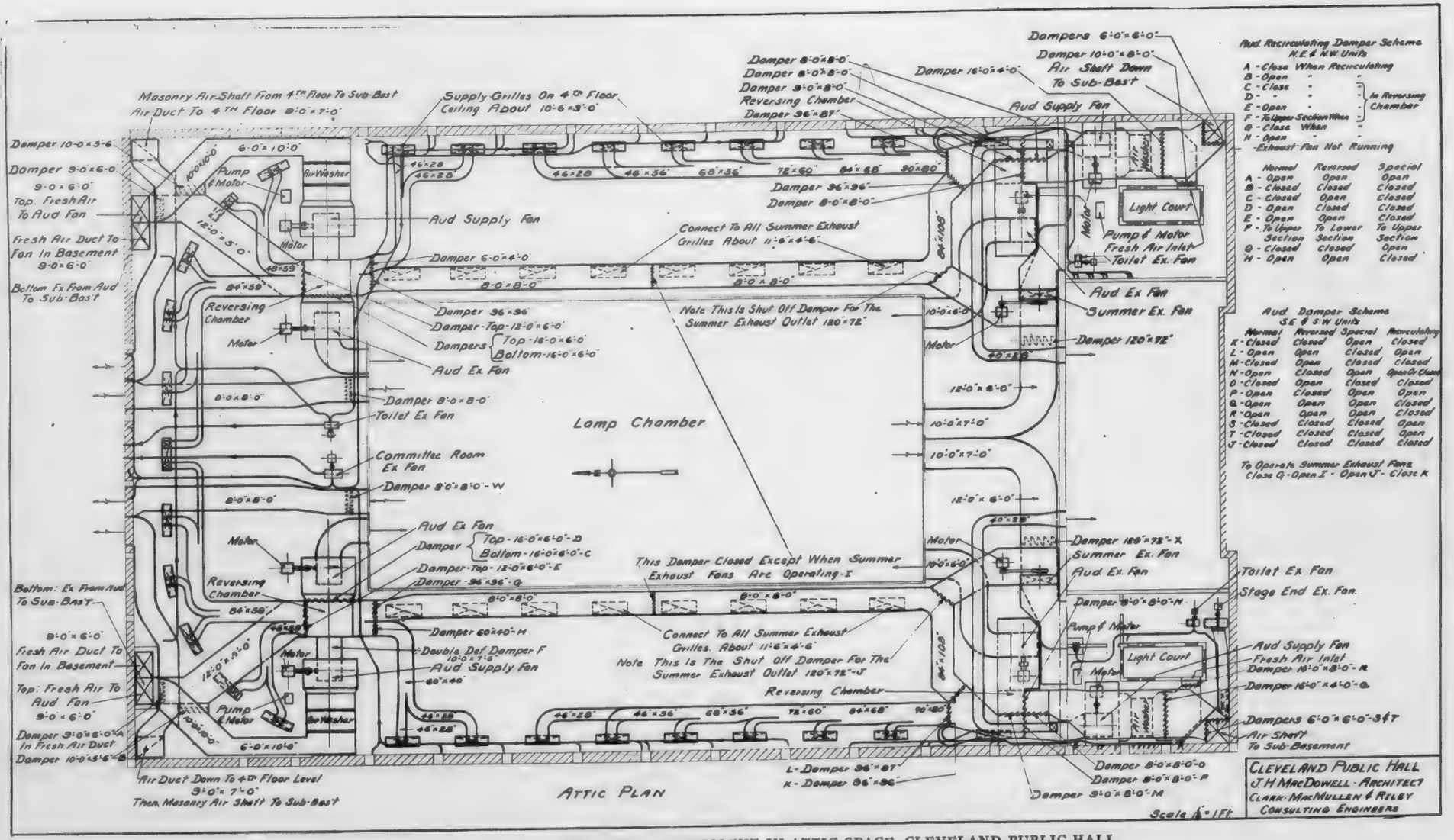

Masonry Air Shaft From 4th Floor To Sub-Bast
Air Duct To 4th Floor 8'-0" x 7'-0"
Supply Grilles On 4th Floor Ceiling About 10'-6" x 3'-0"
Damper 8'-0" x 8'-0"
Damper 8'-0" x 8'-0"
Damper 9'-0" x 8'-0"
Reversing Chamber
Damper 36" x 87"
Damper 16'-0" x 4'-0"
Dampers 6'-0" x 6'-0"
Damper 10'-0" x 8'-0"
Air Shaft Down To Sub-Bas't
Aud Supply Fan
Damper 10'-0" x 5'-6"
Damper 9'-0" x 6'-0"
9'-0" x 6'-0"
Top. Fresh Air To Aud Fan
Fresh Air Duct To Fan In Basement 9'-0" x 6'-0"
Bottom Ex From Aud To Sub-Bas't
Pump & Motor
Air Washer
Motor
Aud Supply Fan
Damper 6'-0" x 4'-0"
Connect To All Summer Exhaust Grilles About 11'-6" x 4'-6"
Damper 96" x 96"
Damper 8'-0" x 8'-0"
Light Court
Pump & Motor Fresh Air Inlet
Toilet Ex. Fan
Aud Ex Fan
Summer Ex. Fan
Reversing Chamber
Damper 96" x 96"
Damper - Top - 12'-0" x 6'-0"
Dampers { Top - 16'-0" x 6'-0" / Bottom - 16'-0" x 6'-0"
Aud Ex. Fan
Note This Is Shut Off Damper For The Summer Exhaust Outlet 120" x 72"
Damper 120" x 72"
Damper 8'-0" x 8'-0"
Toilet Ex Fan
Lamp Chamber
Committee Room Ex Fan
Damper 8'-0" x 8'-0" - W
Aud Ex Fan
Damper { Top - 16'-0" x 6'-0" - D / Bottom - 16'-0" x 6'-0" - C
Damper - Top - 12'-0" x 6'-0" - E
Damper - 96" x 96" - G
This Damper Closed Except When Summer Exhaust Fans Are Operating - I
Damper 120" x 72" - X
Summer Ex. Fan
Aud Ex. Fan
Toilet Ex Fan
Stage End Ex. Fan.
Damper 8'-0" x 8'-0" - N
Bottom: Ex From Aud To Sub-Bas't
9'-0" x 6'-0"
Fresh Air Duct To Fan In Basement
Top: Fresh Air To Aud Fan 9'-0" x 6'-0"
Damper 9'-0" x 6'-0" - A In Fresh Air Duct
Damper 10'-0" x 5'-6" - B
Damper 60" x 40" - H
Double Def. Damper F 10'-0" x 7'-6"
Aud Supply Fan
Connect To All Summer Exhaust Grilles. About 11'-6" x 4'-6"
Note This Is The Shut Off Damper For The Summer Exhaust Outlet 120" x 72" - J
Reversing Chamber
Aud Supply Fan
Fresh Air Inlet
Damper 10'-0" x 8'-0" - R
Damper 16'-0" x 4'-0" - Q
Dampers 6'-0" x 6'-0" - S & T
Air Shaft To Sub-Basement
Air Duct Down To 4th Floor Level 9'-0" x 7'-0" Then Masonry Air Shaft To Sub-Bast
L - Damper 36" x 87"
K - Damper 86" x 96"
Damper 8'-0" x 8'-0" - O
Damper 8'-0" x 8'-0" - P
Damper 9'-0" x 8'-0" - M
ATTIC PLAN
Scale 1/8" - 1 Ft.
Aud. Recirculating Damper Scheme N.E. & N.W. Units
A - Close When Recirculating
B - Open "
C - Close "
D - " "
E - Open "
F - To Upper Section When
G - Close When
N - Open "
Exhaust Fan Not Running
In Reversing Chamber
Normal Reversed Special
A - Open Open Open
B - Closed Closed Closed
C - Closed Open Closed
D - Open Closed Closed
E - Open Open Closed
F - To Upper Section / To Lower Section / To Upper Section
G - Closed Closed Open
N - Open Open Closed
Aud. Damper Scheme S.E. & S.W. Units
Normal Reversed Special Recirculating
K - Closed Closed Open Closed
L - Open Open Closed Open
M - Closed Open Closed Closed
N - Open Closed Open Open Or Closed
O - Closed Open Closed Closed
P - Open Closed Open Open
Q - Open Open Open Closed
R - Open Open Open Closed
S - Closed Closed Closed Open
T - Closed Closed Closed Open
J - Closed Closed Closed Closed
To Operate Summer Exhaust Fans Close G - Open I - Open J - Close K
CLEVELAND PUBLIC HALL
J. H. MacDOWELL - ARCHITECT
CLARK - MacMULLEN & RILEY
CONSULTING ENGINEERS

FIG. 3.—LOCATION OF VENTILATING EQUIPMENT IN ATTIC SPACE, CLEVELAND PUBLIC HALL.

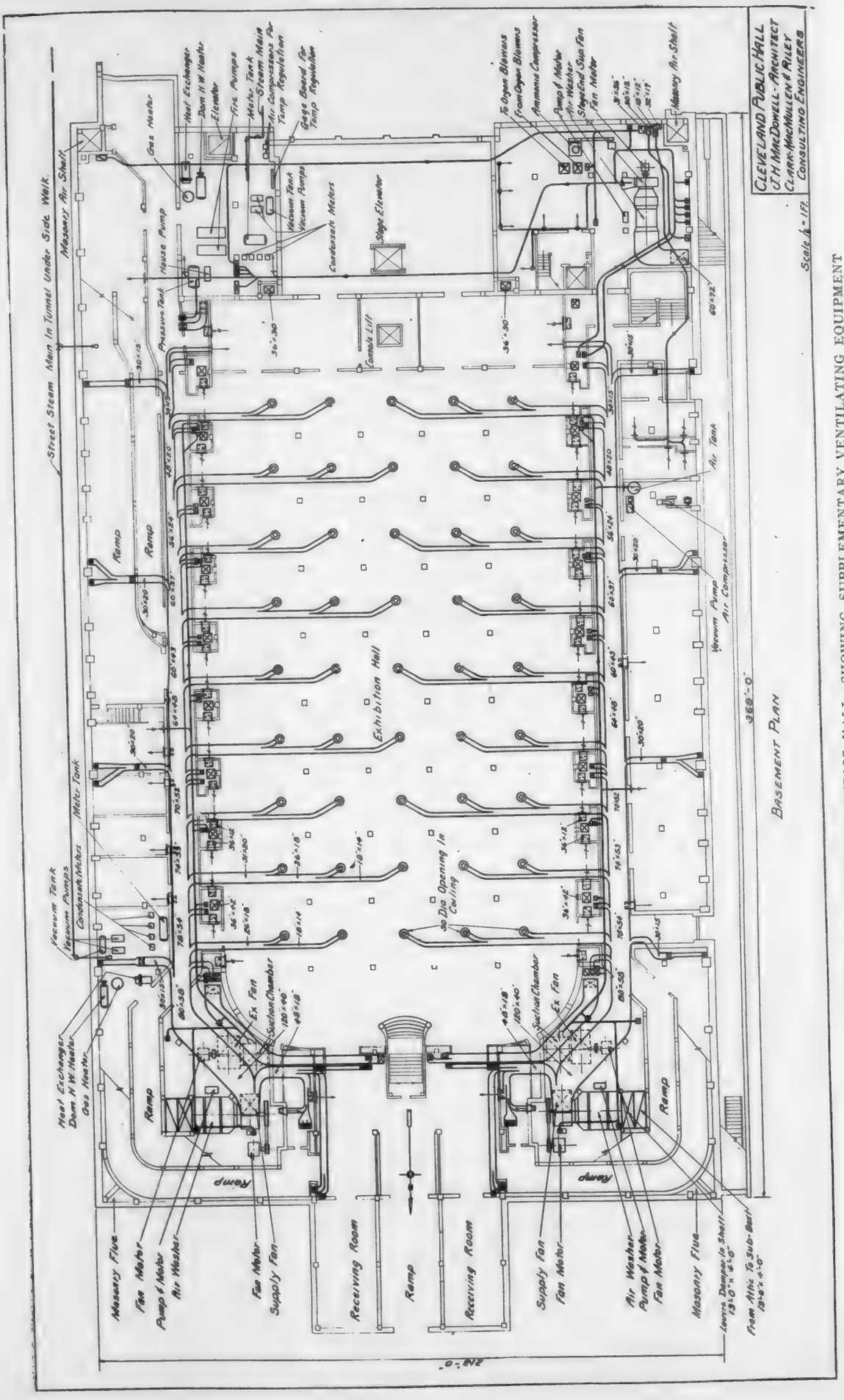


FIG. 4.—BASEMENT PLAN, CLEVELAND PUBLIC HALL, SHOWING SUPPLEMENTARY VENTILATING EQUIPMENT

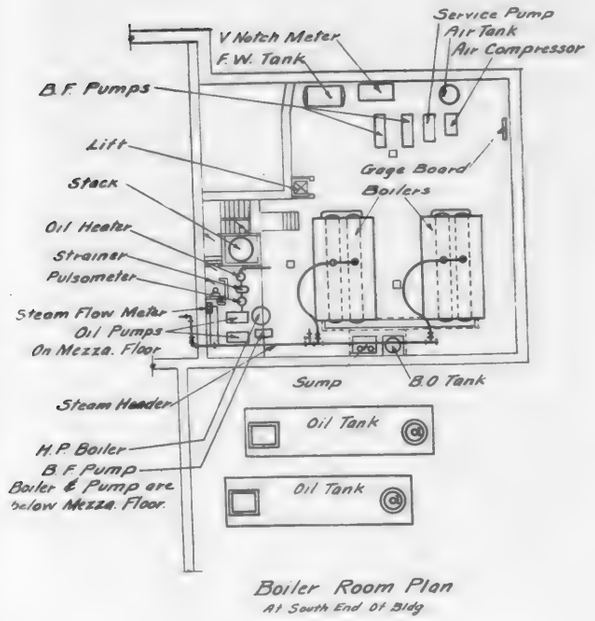


FIG. 5.—DETAIL OF BOILER ROOM, CLEVELAND PUBLIC HALL.

the arrangement would be damper "A" in fresh air duct open, upper section of damper "F" open, lower section closed. Thus the supply fan would discharge air into the upper half of the switch chamber. Damper "G" would be closed and dampers "H" and "E" would be opened. Damper "D" would be closed and damper "C" open. Damper "B" in the cross connection between the fresh air duct and main exhaust duct would be closed.

If this unit is to be reversed, the lower section of damper "F" would be open and the upper section closed. Damper "C" would be closed and damper "D" open. Damper "E" would be open. This arrangement would allow the exhaust fan to take air from the grilles near the outside walls and at the end of the auditorium through the upper section of the switch chamber while the supply fan is delivering air to the lower section, thus this unit would be working as an "upward" ventilating system. If it was desired to supply air into the summer exhaust grilles the system would be operated in the "downward" direction and dampers "D," "E" and "H" would be closed and damper "G" open and damper "I" closed.

To operate this unit in the recirculating position damper "A" would be closed, damper "B" open. The upper section of damper "F" would be open and the lower section closed and dampers "C," "D," "E" and "G" would be closed and damper "H" open.

The northeast unit is exactly the same as the northwest unit except that the hand is reversed.

AIR SUPPLY SYSTEM DESIGNED FOR VENTILATION ONLY.

The general supply system furnishes air at constant temperature for ventilation only, all spaces to which it is connected being heated by direct radiators. This system supplies air to all parts of the basement except the stage end, and to the first, second and third-floor corridors and lobbies. The air handled by the supply fans of this system can be recirculated in part or entirely, depending on the amount of ventilation required, and to permit of a certain amount of heating by means of air if necessary.

Because of the large size of the air ducts required for the auditorium and general exhaust system, space for the ducts could not be found above the basement floor. A number of these ducts were, therefore, located below the basement floor

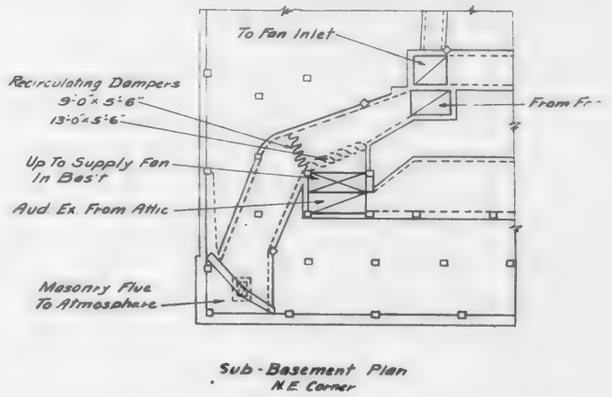


FIG. 7.—DETAIL OF SUB-BASEMENT PLAN, NORTHEAST CORNER.

and underground. All such ducts were built of concrete or brick.

SEPARATE VENTILATING SYSTEM FOR STAGE.

The stage end of the building has been equipped with a separate ventilating system so that the main units will not have to be operated in order to furnish ventilation at times when the stage, chorus, rehearsal and dressing rooms only are in use.

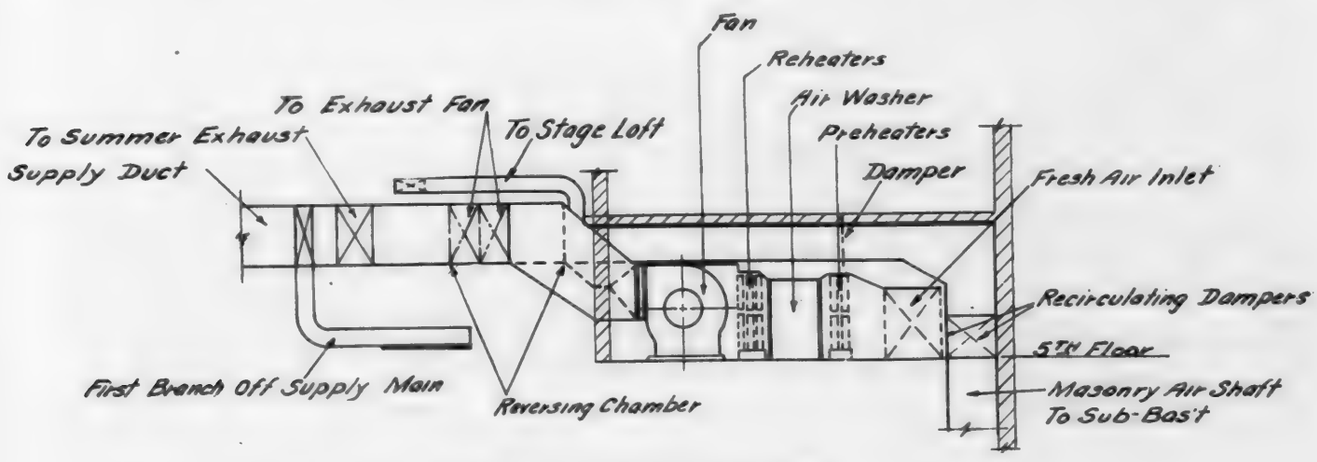


FIG. 6.—GENERAL ARRANGEMENT OF AUDITORIUM SUPPLY UNITS AT SOUTHEAST CORNERS, CLEVELAND PUBLIC HALL.

Check rooms and committee rooms on the second and third floors are ventilated by exhaust only, the air being delivered in large volumes to the corridors on these floors, with grilles provided in the doors and walls so air has easy access to the rooms.

The toilet exhaust system is divided into three sections in order to meet structural conditions. Toilets are ventilated by exhaust only.

All reversing, recirculating and shut-off dampers throughout the job are controlled by pneumatic switches on the temperature-control board in the basement. All air inlets and outlets to atmosphere are equipped with air-operated shut-off dampers so the building can be closed tight if required.

TEMPERATURE CONTROL OF AUDITORIUM AIR SUPPLY.

The temperature of the air delivered to the auditorium is controlled by four pilot thermostats, one for each unit, the thermostats being located at about the center of the balcony and in each corner. These thermostats control three-point relays at the re-heaters, the relays being adjusted so that each row of coils is cut in or cut out about two degrees apart. The temperature of the air entering each air washer is controlled by a thermostat between the tempering coils and the air washer. The first row of tempering coils is under hand control only. The temperature of the air handled by the general supply fans and stage end supply fan is controlled by duct thermostats on the discharge side and by thermostats located between the tempering coil and the air washer. The first row of heaters in the tempering coils for these two systems are also under hand control only.

All rooms, corridors and entrance lobbies with outside exposure are equipped with direct radiators and all radiators in public and semi-public spaces are under thermostatic control; other radiators are under hand control.

STEAM DEMAND SO GREAT AS TO REQUIRE AUXILIARY STEAM PLANT.

The steam demand in zero weather in this building is so great, when both the direct heating system and ventilation systems are in operation, that the steam service company could not guarantee delivery of all the steam required. Thus it was necessary for the city to build an auxiliary or booster steam plant. This plant is required to supplement the outside steam service when the outside temperature drops to 20° F.

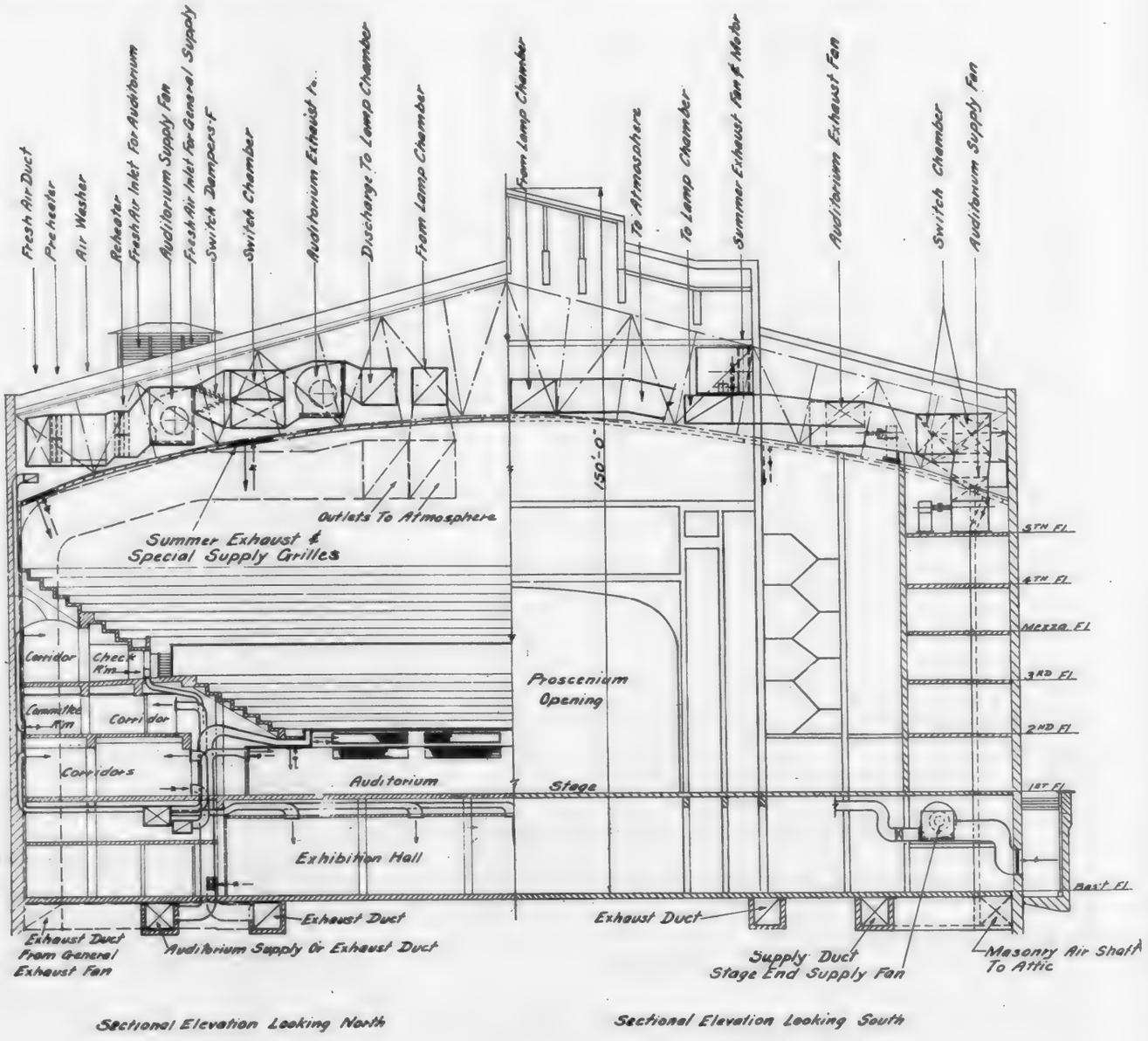


FIG. 8.—CROSS SECTIONS OF CLEVELAND PUBLIC HALL, SHOWING GENERAL VENTILATING SCHEME.

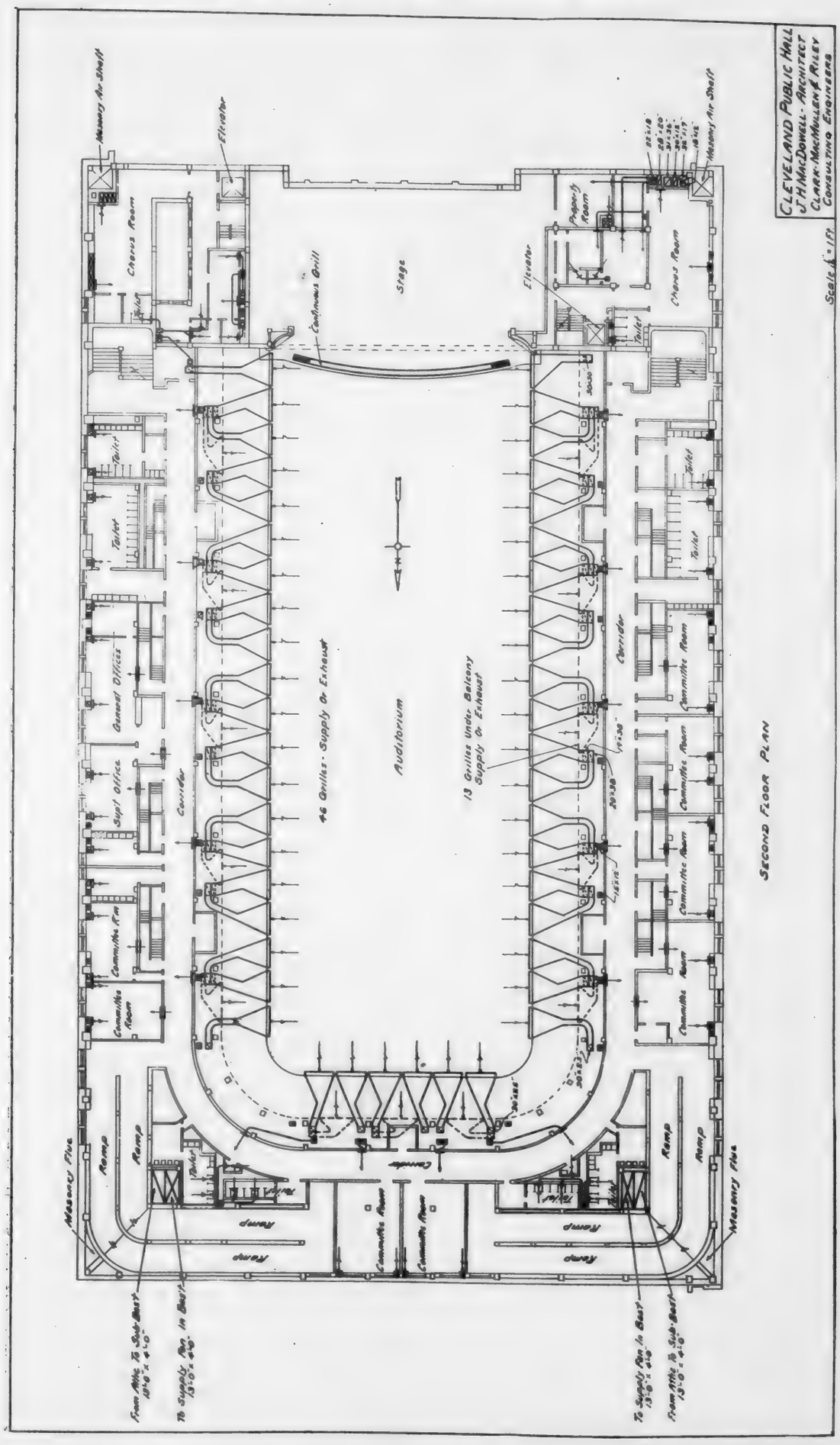


FIG. 9.—SECOND FLOOR PLAN, CLEVELAND PUBLIC HALL.

When the auxiliary steam plant is in service the building is supplied with steam from two sources. Thus it was necessary to provide means for preventing steam generated by the auxiliary plant from finding its way into the street mains, and provision had to be made for metering the steam furnished by the steam company and by the auxiliary plant so that proper bills could be rendered to the city. There are two points at which outside steam enters the building. At each of these a counterflow valve has been installed which is connected so that should the pressure on the heating system be higher than the pressure in the street main the counterflow valve will close. Thus the building would be supplied with steam only from the auxiliary plant until the street steam pressure rises to the proper point, or the pressure on the heating system drops below that in the outside steam mains.

The steam generated by the auxiliary plant is metered by a Bailey steam flow meter and as a check upon same the water supplied to the auxiliary boilers is measured by a recording V-notch meter. All water of condensation from the heating system passes through condensation meters furnished by the steam company and the reading of the flow meter is subtracted from the total readings of the condensation meters, the city being charged for the remainder.

OIL-FIRED BOILERS USED.

The auxiliary boiler plant consists of two 500 H. P. horizontal-type water-tube boilers. These boilers are oil fired. In case of a complete breakdown of the outside steam service it would be possible for the auxiliary steam plant to furnish 75% of the total steam required in zero weather. Thus all essential service could be taken care of under the most unfavorable circumstances.

The boilers are in single setting, with suspension at both ends; the front header is 11 ft. from the floor and the rear header 9 ft. 6 in. from the floor. The boiler is baffled horizontally to give three passes; the combustion chamber contains 1800 cu. ft. Provision is made for burning coal, using hand-fired stokers, in case of oil shortage or complete breakdown of the oil-burning equipment.

The oil-burning system is similar to that used by the navy and is the mechanical atomizing type, the oil being supplied to the burners at about 250 lbs. pressure. The boilers operate at 35 lbs. pressure, which is the maximum allowed by the City Code for buildings of this kind.

VACUUM PUMP INSTALLATION.

On account of the size of the building, two sets of rotary vacuum pumps have been installed. This permits the use of relatively small return mains and simplifies the piping system. These two sets of pumps are cross-connected so that during times of light load it would be possible to handle the entire building with one set. All water of condensation passes through heat exchangers before entering the vacuum pumps. These heat exchangers are used to pre-heat the domestic hot water and could be used as primary heaters in case the main domestic water heaters were out of commission.

Provision has been made for returning to the boilers all water of condensation required to supply the boiler plant with feed water, all return water in excess of this amount being discharged to the sewer.

SUPPLEMENTARY EQUIPMENT.

In addition to the elaborate heating and ventilating equipment, this building is furnished with special equipment to supply the needs of visitors and exhibitors.

A drinking water system using a CO_2 compressor supplies ice water to drinking fountains throughout the building and an air compressor and large storage tank, with necessary piping system connecting to service pockets in floors and walls of the exhibition hall and auditorium, furnishes compressed air at 100 lbs. per square inch for demonstration purposes.

A vacuum pump and pipe system has also been installed for chemical and other processes.

High and low-pressure steam, gas, hot and cold water and waste connections have also been made to service pockets in the exhibition hall and auditorium.

J. H. MacDowell is the architect and Clark, MacMullen & Riley are the consulting engineers for the Cleveland Public Hall.

Problems in Hot Water Circulation.

Those who have unexpectedly discovered hot water radiators which persistently refuse to circulate, although they appear to have every advantage that others have, may be interested in cases I have met and remedied. When a certain hot water job was completed, the owner desired that a small pipe coil should be placed in a vestibule near the back stairs, "just to take the chill off." When the coil was connected it circulated well, but circulated backwards, the hottest part being the bottom pipes. The owner was very eccentric. He refused to accept the installation unless it circulated right side up. We ran the coil supply up a story and down again, thinking it would then balance properly, but it did not. We tried out several other theories with no better success. At last we made it circulate properly.

We had also a case in New York, where one radiator, close to the bottom of a vertical riser, would not heat at all. We were young then in water heating, and ran 400 ft. of a pipe circuit from the boiler to that radiator before we could make it heat. We were called in consultation many times by brother fitters who were treed by radiators they could not make circulate.

At last we discovered the remedy which makes every radiator circulate well and cheaply. Had we known this trick we would be many dollars richer than we are to-day; for we spent much time and money making stubborn radiators work. The remedy for stubborn radiators is this: carry the return of the stubborn radiator back into the radiator feed pipe. It always works well. Fitters think you are kidding them when you tell them this remedy.

Some years ago, a widow desired water heat in a dwelling with the stipulation that the heater should be placed in a kitchen which was 5 ft. higher than the first floor of the house. The job was turned down as impractical by every fitter on the ground that the first floor would lie dead, being lower than the fire. The installation, however, was successfully made by leading all the hot water from the heater to an expansion tank in the attic, and distributing it from the tank. As the fire drove all the water to the tank, it had to circulate or overflow. It has worked 30 years with entire satisfaction. If connected in the ordinary way, it would have been a failure.

To illustrate the facility with which one can get into trouble in hot water circulation, the writer met a leading contractor with a very long face, whose $10,000 final payment on an office building was held up over six months because he could not produce instantly hot water at each lavatory, as agreed. He had spent thousands of dollars experimenting and was at the end of his rope. He seemed glad to see me, arranged that I meet his foreman at the job and suggest what was wrong. Before going in I had the foreman tell me how he had carried the water.

We had the remedy applied inside of an hour. His trouble was that he was feeding his hot water upward. When he fed it at the top of all risers, and let it descend as it cooled, the trouble was over. He simply had to cut the connections top and bottom and connect so that it fed from the top.

STEAM WASTE IN HEATING RAILROAD COACHES

With a Review of the Development of Present Car Heating Methods and Notes on the Economic Value of Thermostatic Control

BY T. W. REYNOLDS.

II.

VARIABLE steam pressure at coaches make it quite difficult to regulate the temperature for each coach unless a temperature thermostatic control system is used, though a design of heating apparatus that will give temperature regulation for each coach with varying steam pressure is more complicated than a system with constant steam pressure and for this reason it is not an easy matter to perfect an entirely satisfactory car heating system.

However, there is no reason why cars should not be equipped so as to give the desired regulation, that is, temperature regulation of the car. Any amount of money is spent on car lighting, a factor not so important for the physical comforts of the passengers as car heating, since in transit the cars are under heat practically all the time while the lighting is only used part of the time. Thus, the greatest discomfort to the traveling public during the winter weather is either the under or over-heating of the cars and so it is evident that good regulation and economical operation of the heating apparatus is one of the important factors to be considered in train equipment at the present time.

A TYPICAL TEMPERATURE—REGULATION SYSTEM FOR CARS.

A system of thermostatic temperature regulation which has been developed to meet the difficulties described consists primarily of a thermostat located on one side in the middle of the car. This thermostat (Fig. 5) is merely the usual diaphragm expanding with an increase and contracting with a decrease in the temperature of the surrounding air, thereby making or breaking the *electrical circuit which, in turn, actuates the magnetically-operated steam control valves, thus governing the admission of steam to the heating system. The steam inlet valve may also be electrically controlled, either by the thermostat or discharge mechanism, or both (Fig. 6).

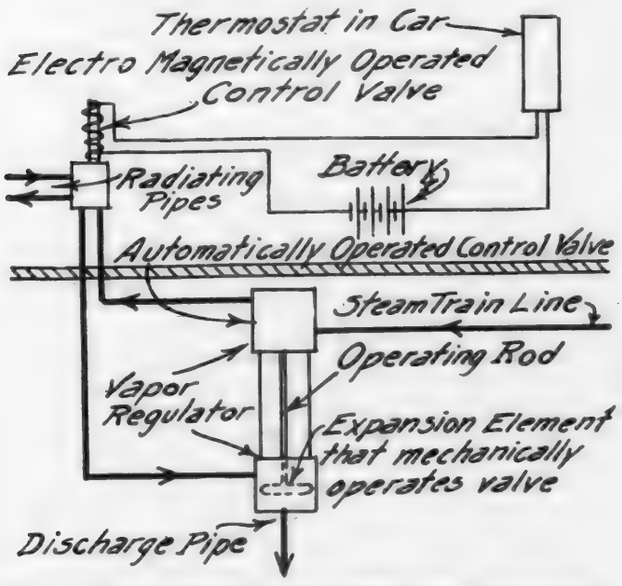


FIG. 5.—DIAGRAMMATIC ARRANGEMENT OF MECHANICALLY-OPERATED INLET VALVE AND THERMOSTATICALLY-CONTROLLED MAGNETIC VALVE.

With thermostatic regulation adjusted to open or close the steam supply at the respective limits of 68° and 70° F. the performance is as follows:

Starting a cycle of operation when the temperature of car has decreased to 68° F. (radiating pipes being cooled down to approximately car temperature) the thermostat opens the circuit, magnetically-controlled valves being thus released admit steam and the temperature of the piping rises to a maximum of about 210° F., maintaining this maximum until the temperature in the car has reached about 70° F., when the thermostat switches over and the admission valves are automatically closed by the current. During this time condensation is discharged from the car in large volume, the average temperature of same, however, being lower than from cars not thermostatically regulated, so that less heat is lost in condensation.

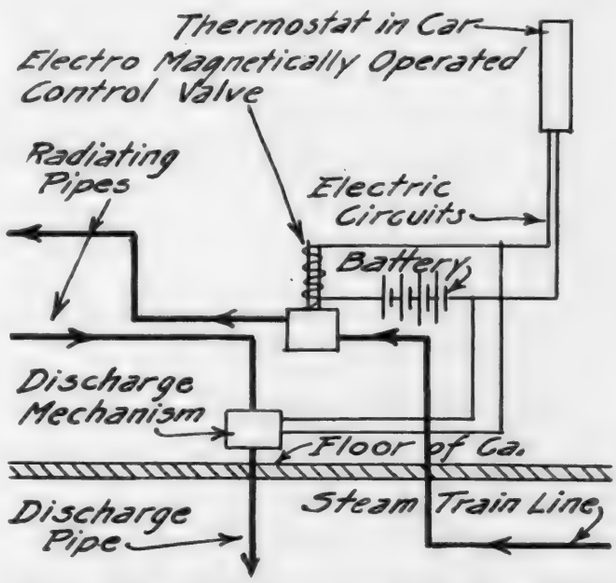


FIG. 6.—DIAGRAMMATIC ARRANGEMENT OF MAGNETIC VALVE AND DISCHARGE MESHANISM, BOTH THERMOSTATICALLY CONTROLLED.

Records taken by automatic recording devices indicate that on a standing car under outside temperature of, say, between 30° and 40° F. the thermostat shuts off steam for periods of from one to two hours, the heat stored in the radiators being sufficient to maintain the temperature in the car above 68° F., the lower working limit of the thermostat. Between these periods steam is admitted to the system for intervals, says, of 15 minutes only, this time being sufficient to raise the temperature of the car to 70° F., the upper working limit of the thermostat. With lower outside temperatures, increased ventilation or some of the radiating surface not fully effective (as frequently occurs with imperfect adjustment of the regulator), the frequency and duration of steam admission is increased and the gain in economy from automatic regulation proportionately decreased.

Hence, automatic regulation produces the largest saving in steam under high outside temperatures, a minimum of ventila-

*Current for operating the system is taken from the lighting circuit.

tion and full effectiveness of the radiating surface, and its value diminishes rapidly with reversed conditions.

COMPARISON OF SERIES AND MULTIPLE ARRANGEMENT OF RADIATING PIPES.

The radiating pipes used on steel passenger coaches are connected in multiple or series, corresponding to the familiar manifold or return-bend coils, respectively, as used in other heating and ventilating work, but whether connected in series or multiple, they have multiple regulation, and five or six pipes constitute a set on each side of the car, each set being fed through one vapor regulator and controlled by one or two vapor cut-out valves.

In the series system, with multiple control and two cut-out valves (Fig. 7), two, three or all five radiating pipes in each set may be used so that in extreme cold weather, all the radiating pipes may be placed in service, or in milder weather some combination or * percentage of the total. With both vapor regulators shut off, steam is by-passed to the discharge where it acts upon the expansion element allowing enough steam to flow to eliminate freezing, the piping then draining through an opening in the valve itself.

While in the series arrangement, cut-out valves completely cut out the radiating coils at both the delivery and discharge end, with multiple connections only the delivery end is open or closed, and in such systems vapor may back up from the discharge end and heat the pipes on the sections that are shut off.

By multiple connection (Figs. 8-9), steam after passing through the vapor regulator is admitted at the top of the pipes, from which point it divides and takes different paths, thence draining to one common discharge pipe in the lower part of the system, while in the series system, steam is supplied at the bottom and the upper pipes drained by gravity and the force of steam.

In the series system, heating of the piping will not be uniform throughout, since the steam passes through a greater length of pipe and the temperature difference at the delivery and discharge end will, for the same distribution of heat, be greater than in the multiple system where the paths are less.

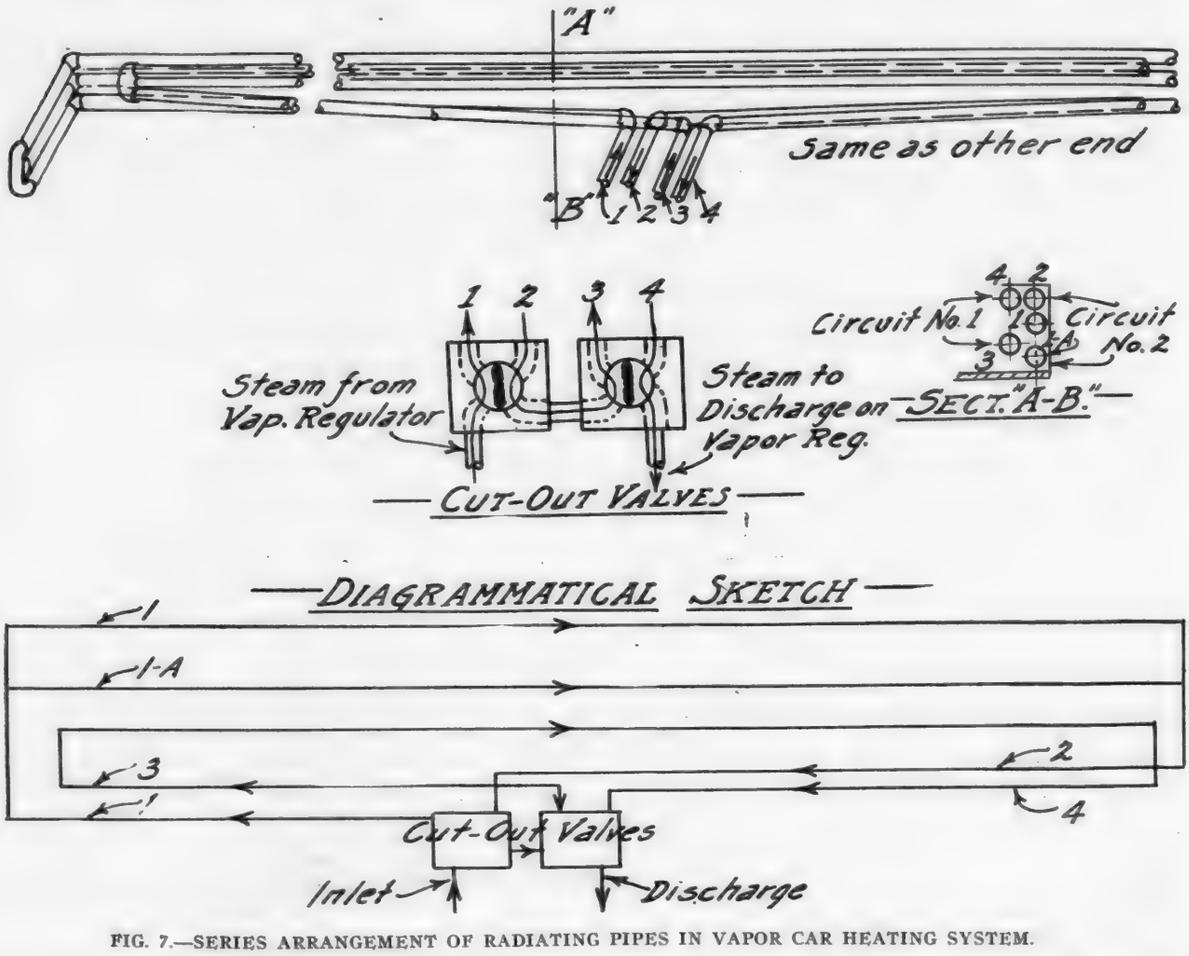


FIG. 7.—SERIES ARRANGEMENT OF RADIATING PIPES IN VAPOR CAR HEATING SYSTEM.

The series system also forces steam from the bottom coils to the upper coils and condensation is liable to back up against the vapor regulator, causing trouble. Furthermore, if coaches are not properly taken care of while delayed en route or while standing at terminals, freezing of some part of the system might take place (as often happens), in which event, unlike the multiple system, the entire radiating surface is out of service, pending repairs. On the other hand, in the multiple system, the steam takes several different paths before reaching the common point of discharge, some of these paths being 70 ft. in length, and if one offers less resistance than the other, due to a shorter distance or condensation in the pipes, the distribution of heat will be unequal in different parts of the car.

When steam is first turned on to the heating system, due to the discharge expansion element being cold, steam will flow through the radiating pipes at a high velocity, and the different pipe circuits in the multiple system will offer varying resistance to the flow of steam, on account of the position and varying lengths. The circuit offering the least resistance will discharge hot vapor over the expansive element before the other circuits and this will tend to prematurely close the vapor regulating valve. The discharge mechanism of this valve will then start to control the supply of steam and the pipe circuits that have not heated up will remain cold, due to the low pressure at the delivery. A slight obstruction in any circuit of the pipe will

* 20%, 30%, 40%, 50%, 70%, 80%, 100%.

tend to stop the flow of steam and if one end of the radiating pipes is low, or is out of position, the pipes will partly fill with condensation, causing a retarded flow of steam.

In making laboratory tests, even under the most favorable conditions, it was found almost impossible to heat up all the sections on the multiple system of radiation. Therefore, with due consideration of the advantages and disadvantages of each system, for best all-around conditions and efficiency, the radiating pipes should be connected in series, so that the steam must pass through all the pipes before entering the discharge mechanism. Better radiation can undoubtedly be obtained by such an arrangement, while the installation will also be cheaper because the usual complicated pipe fittings can be eliminated. It might also be possible to reduce the amount of pipe due to the better distribution, but it is evident that with the same amount of pipe the advantage of a greater heat radiation and distribution will be obtained.

THE ECONOMY OF THERMOSTATIC REGULATION.

Some car heating systems, as previously described, are arranged so that the whole surface may be turned on or off by hand, while, in the case of others, part of the radiating surface is short-circuited and only a portion of the total left active, making heating of the car less uniform than if the entire amount were in service. In such systems, as a step towards temperature regulation, the amount of radiation can be changed by means of by-pass or cut-out valves, but these valves are of use only with certain outside temperatures and not with variations of such temperatures, and, being manually operated, they are not very satisfactory if good temperature regulation is desired.

Thermostatic control gives the best regulation by maintaining the entire radiating surface in use (instead of curtailing some), and also by operating this surface at a lower temperature. Such methods of operation result in more uniform heating of the car and more agreeable heat during mild winter weather for the reason that the average temperature of radiating surfaces is reduced. Incidentally, the temperature of condensation discharged and lost from the radiating pipes is also reduced, thus utilizing from the steam supplied to the car a greater number of heat units as compared with conditions where condensation is discharged at higher temperatures.

It is also possible to maintain the temperature of radiating surfaces at a minimum and not higher than required to satisfactorily heat a car, and, if at all times, the temperature within a car is positively controlled by such regulation so as to prevent its exceeding, say 70° F. while in passenger service, and say 50° or 60° F. while in storage, a very great amount of steam and fuel would be saved in the passenger car service of the country. A saving would also accrue from the prevention of the destructive influence of excessive temperatures upon equipment, since temperatures even as high as 147° F. have been observed. An appreciable amount of locomotive boiler capacity would also be made available for traction and the yard service equipment reduced.

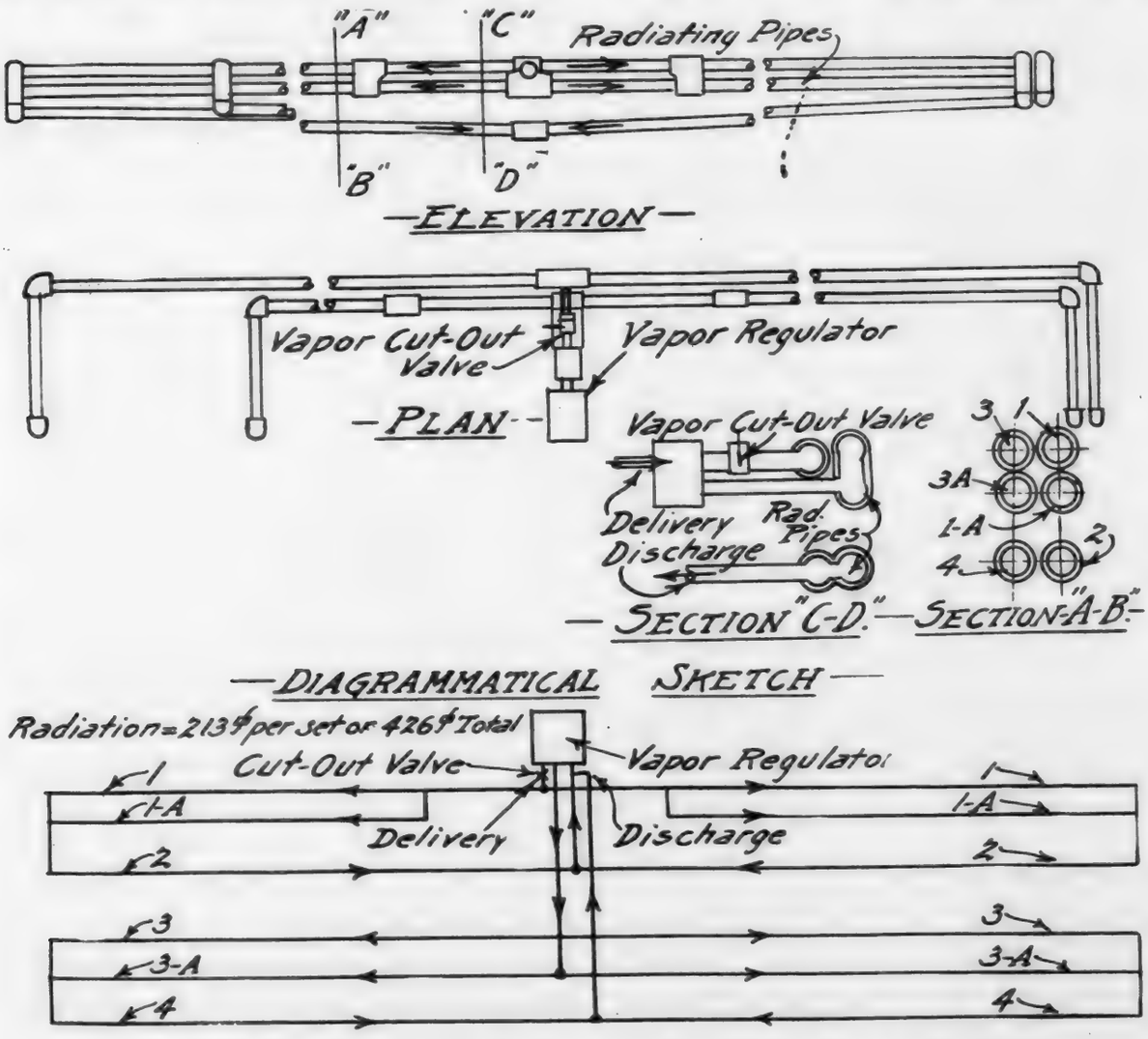


FIG. 8.—MULTIPLE ARRANGEMENT OF RADIATING PIPES IN VAPOR CAR HEATING SYSTEM.

From tests published in THE HEATING AND VENTILATING

MAGAZINE for December, 1921, it was shown that the cars equipped with thermostatic control, consumed in the average about 50 lbs. of steam per hour less than those without control, the temperature in the cars at the same time being 20° F. lower. This saving in steam is largely explained by the intermittent admission of steam, the lower temperatures of condensation, and in addition thereto, by the fact that the change of air through the roof ventilators is less frequent at lower car temperatures. The consumption of steam depends to a large extent on the position of these ventilators, which if open, become increasingly active with increased inside temperature. For the tests, an average setting of the ventilators was taken, and the same conditions were maintained in all cars to secure comparable results.

The efficiency of thermostatic regulators is also intimately related to the working of the vapor regulators, and this leads to the conclusion that a satisfactory performance in actual service can be expected with certainty only if the vapor regulators and other portions of the heating systems are performing their share of the work in proper manner.

Inasmuch as thermostatic control is of economical value only if opportunity is offered for reducing the time of steam consumption, and as the steam consumption can be reduced only if full heat is maintained on all heating coils, it is evident that the vapor regulator saves practically no steam in case the heating system is working so that the regulator is compelled to admit steam most or all of the time, or if the outside temperature is so low that an amount of heat corresponding to the maximum capacity of the heating system is required.

THE ECONOMY OF THERMOSTATIC REGULATION NOT OBTAINABLE IF OTHER CONDITIONS ARE UNECONICAL.

Thus it will be seen from the foregoing that vapor regulators, unlike the thermostat in a temperature-regulation system, will not hold constant temperature of the car for varying outside temperatures, because the radiating ratios of the radiating pipes and car walls for different temperatures are not constant. During warm weather, to keep the car from overheating, if sufficient radiation is installed for cold weather, part of the radiation in the car will have to be cut out, which means constant attention by one of the train men if satisfactory results are to be obtained.

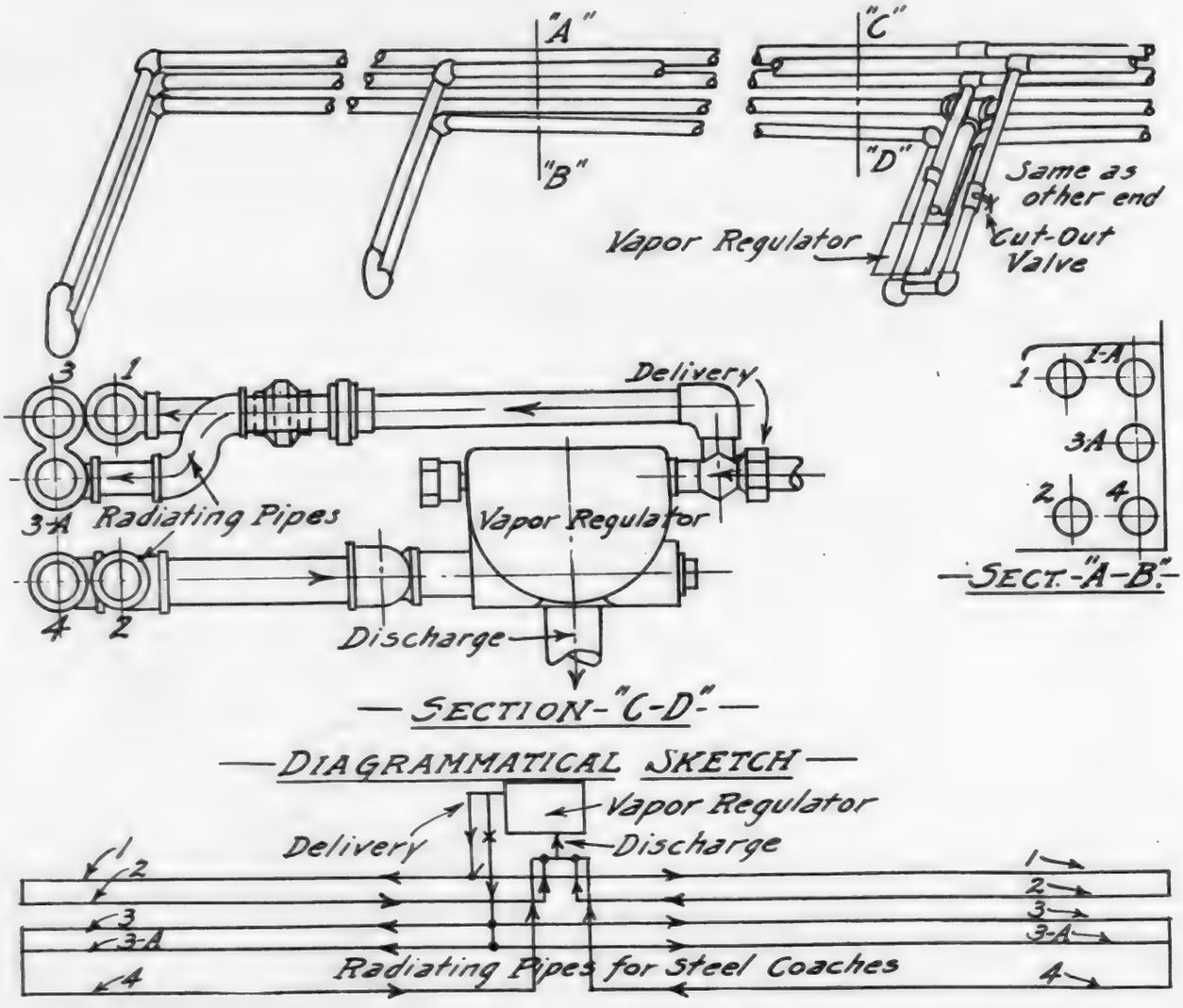


FIG. 9.—ANOTHER MULTIPLE ARRANGEMENT OF RADIATING PIPES IN CAR HEATING SYSTEM.

In the case of open windows, no saving, of course, can be expected from heat regulating devices. The thermostat being actuated by the surrounding air temperatures will keep the steam valve wide open as long as the temperature does not exceed the maximum limit to which the regulator is kept, i. e., about 70° F. In cars standing with open windows this temperature is never reached unless the outside temperature is high, perhaps so high that no steam is required for heating. Consequently, with cars standing in terminals with open windows 30% to 50% of the time, the saving previously referred to of 50 lbs. of steam per car per hour should be reduced at least to 30 lbs. Furthermore, with cars on the road only 23% of the total time,

as shown by the figures on mileage, the terminal conditions where over-heating largely takes place predominate to such an extent that the saving en route, though large in itself, becomes relatively of lessor importance.

Another point for consideration is that the tests were made under an average outside temperature of 34° F. whereas the average temperature of the heating season is about 40° F. so that this affects the average saving obtainable. The higher outside temperatures affords a greater opportunity to the thermostat for reducing the steam consumption. On the other hand, the steam consumption of cars whether thermostatically controlled or not, is reduced by higher outside temperatures.

RECOMMENDATIONS FOR ECONOMIES EFFECTIVE BY OTHER THAN THERMOSTATIC REGULATION.

There is no doubt that a comprehensive investigation as to possible improvements in boiler plants and distribution systems, together with proper inspection of car heating at terminals, would produce results of *comparatively* greater economic value than can be hoped for from regulating devices, though this statement is not made with the intention of minimizing the importance of such regulating devices. Thus, while thermostatic control will effect a very large reduction in steam consumption, the following methods for effecting economies are also suggested.

1. Improvements in boiler plant economy.
2. Reduction of losses between boiler plants and cars. This covers improvements of installation; rearrangement of piping; losses through drips, leaks, etc. Material improvements should also be made in the physical conditions of steam distribution, car heating lines being separated and placed in more favorable location, while an investigation should be made to determine where excessive losses occur and what means are economically justifiable to eliminate them.
3. Regulation of pressure at the boiler plant commensurate with the outside temperature.
4. Shutting off some of the heating surface in the cars standing at terminals by means of sectionalizing valves permitting reduction of radiating surface to a minimum when needed.
5. A rigid system of inspection, possibly combined with a bonus and penalty system, and covering supervision over, —
   (a) Time cars are kept on steam.
   (b) Temperatures in cars.
   (c) Open windows.
   (d) Defective piping, covering and connections.

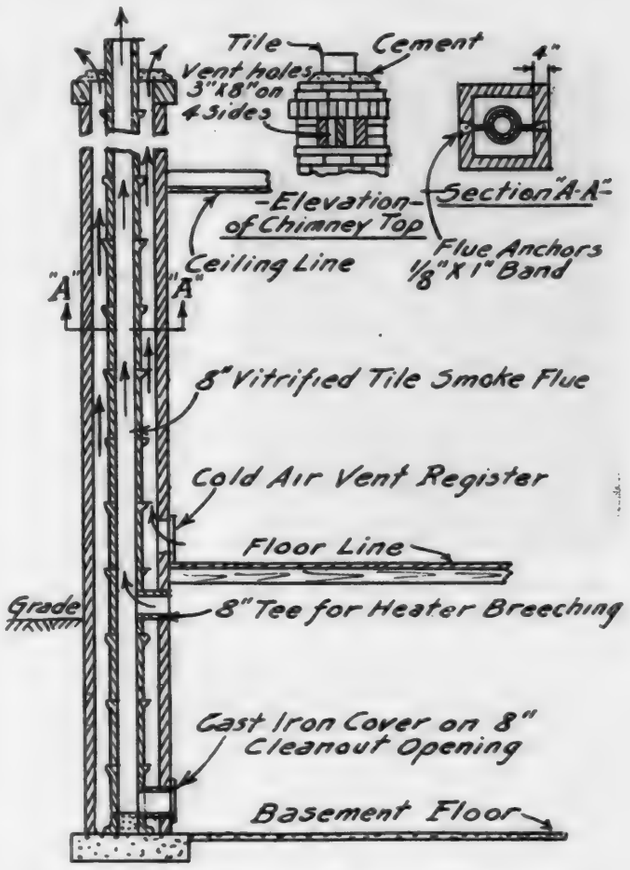
CONCLUSIONS.

It becomes apparent, from the information presented herein, that an ideal steam heating system for passenger coaches should preferably be controlled by the temperature of the car, and also by the condensation discharge, maintaining a constant predetermined temperature in the coach regardless of other conditions, such as the main train-like pressure or outside temperature, since it is of no consequence what the outside temperature is if the inside of the car is comfortably heated.

Thermostatic regulation is of great economic value, the relative saving being greater the higher the outside temperature and also greater on steel cars as compared with wooden coaches. Its use prevents overheating in cars, though proper maintenance of the vapor regulators is required for harmonious working with the thermostats, also such regulation is of no value if the windows are kept open in cars while standing at terminals, which is 75% of the time.

A Combination Chimney And Foul Air Flue.

A foul-air flue with an 8-in. vitrified tile smoke stack in the center, as shown in the sketch, has been found very satisfactory by the School Board of North Dakota for ventilating purposes. The smoke flue from the heater or furnace heats the air in the foul-air flue, giving the air the upward movement and causing the desired draft.



COMBINATION CHIMNEY AND FOUL AIR FLUE.

The center flue is supported at its base by means of a tee fitting which is partly filled with concrete and in turn supported by a concrete slab. A cast-iron cleanout door is attached to the outlet of this tee.

Cold-air vent outlets are made in the wall near the floor of each room and connected into the foul-air flue, the top of which is surmounted by an ornamental brick cap having 3 in. by 8 in. vent holes on four sides.

How to Detect Air Leakage in Boiler Settings and Waste from Steam Traps.

"Air-leakage in boiler settings is easy to detect," says Johns-Manville, Inc., in one of its pamphlets entitled "Fuel Waste in the Power Plant."

According to the directions given, all that is necessary is a simple device, consisting of a sheet of paper about 2 ft. square, a 1-in. hole cut in the center of the paper, and a square wooden frame made of four pieces of 1-in. by 1-in stock, each piece being about 2 ft. long.

The paper is pasted to the frame and the frame held against the boiler wall with the paper side out, making the joints between the frame and wall tight by using putty or fire-clay. A match or a candle held in front of the hole will detect any leakage through the 4 sq. ft. of boiler wall surface because of the draft through this hole, the amount being indicated by the sucking-in of the flame.

To conduct this test successfully, it is essential that all joints between the frame and boiler wall be made air-tight.

VENTILATING EQUIPMENT FOR A MUSIC HALL

Features of Installation in Kilbourn Hall, Rochester, N. Y.

A BUILDING of which Rochester is justly proud is the new Kilbourn Hall of the $2,000,000 Eastman School of Music, which has been established through the Munificence of George Eastman of kodak fame. This school has been made a part of the University of Rochester.

In addition to the ventilating equipment of Kilbourn Hall, unusual attention has been given to the matter of sound deadening. Elaborate precautions have been taken to see that every part of the framework of each room is protected, not only against sound, but vibrations. An inch of cork at the base of the partitions absorbs vibrations. Heating and plumbing pipes in the studio walls are packed with asbestos wool. Fibro felt is placed around the steel columns that support the floors and between all the partitions. Finally, the floors are made noiseless by layers of fibro felt, waterproof paper and cement, with the flooring on top. The windows are double, being warranted sound-proof.

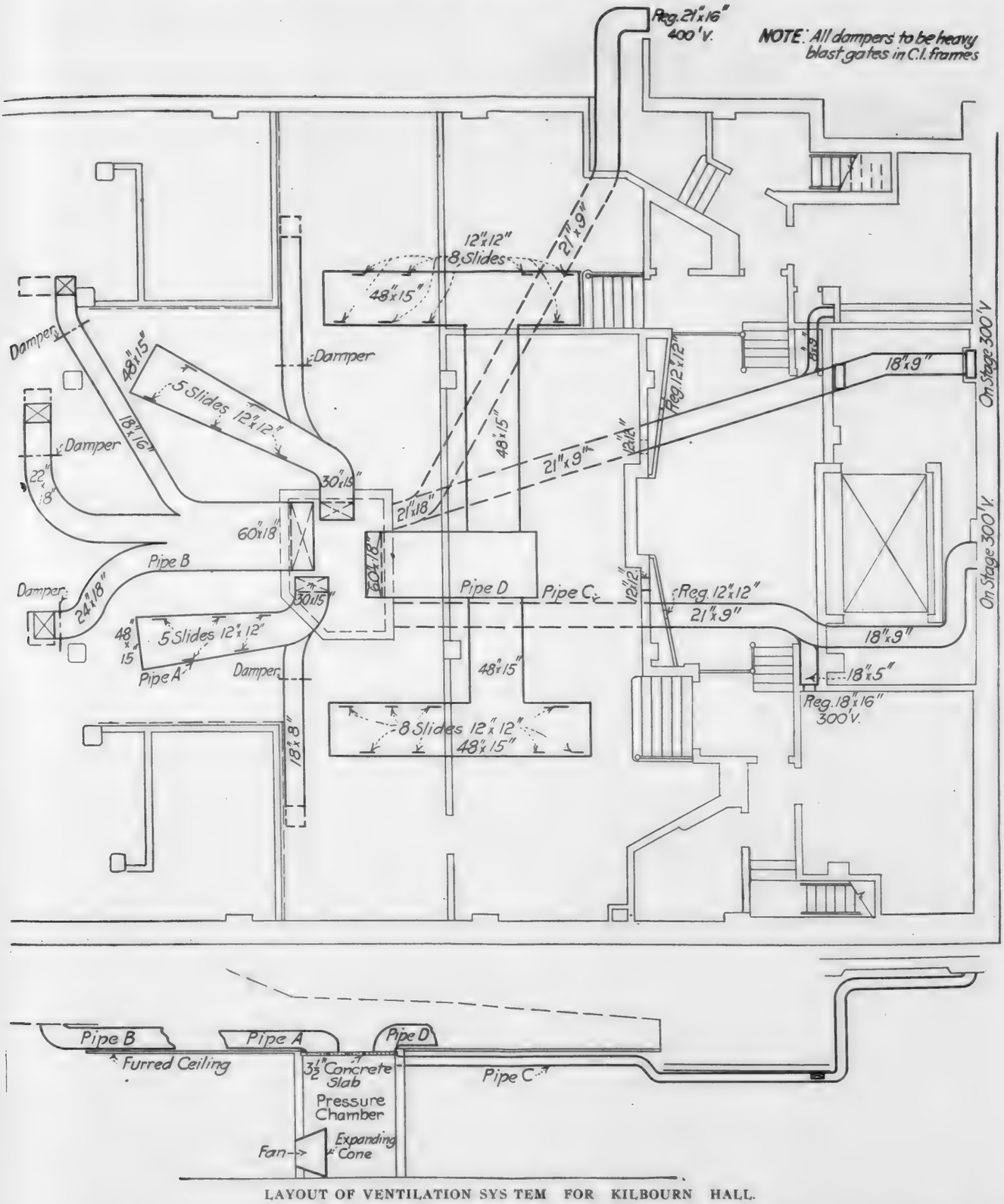
The ventilation of this building has been characterized as unique of its kind. With the completion of the theatre, the ventilating plant was made capable of supplying and exhausting 122,000 cu. ft. of air per minute for the school and Kilbourn Hall. The complete system comprises seven supply and five exhaust fans. Each studio has an intake and exhaust pipe connected with the fans.

In Kilbourn Hall, seats are provided for 535 people. It will be seen from the illustration that the floor of the auditorium is unusually steep, introducing a problem to secure good ventilation at the different levels. The system finally decided upon was an individual floor supply of washed, tempered and humidified air in a volume of 35 cu. ft. per minute per person. The air is delivered mainly through mushroom ventilators under each seat and exhausted through aspirating chambers near the roof.

Fresh air enters the building from an outside court and passes first through a 7 ft. by 6 ft. Sturtevant air washer and thence through a direct single-width, double-inlet No. 9 Sturtevant multivane fan, running normally at a speed of 235 R. P. M. The fan also serves some dressing rooms and the stage, as well as the auditorium. It is located directly under the auditorium and precautions are taken to prevent noise. Beneath the auditorium floor, the ceiling was furred down to make an air chamber.

Both fan and motor are mounted on a concrete base with wood frame, cork, and lead and capstone mounting. As the air leaves the fan, it is expanded, as will be noted from the plan of the layout, through a comb at the discharge end, into a brick chamber, with concrete slab on top. Delivery ducts, with control dampers and distributive slides, are run from this chamber.

INTERIOR OF KILBOURN HALL, LOOKING FROM STAGE.



LAYOUT OF VENTILATION SYS TEM FOR KILBOURN HALL.

DIVISION OF HALL TO ACCOMMODATE SMALL AUDIENCES.

One of the provisions that had to be met in the ventilation of Kilbourn Hall was the arrangement for its division to accommodate small audiences. For this purpose, a sliding curtain is provided, partly down the hall, which may be raised, thus shutting off the rear part of the hall.

Although mushroom ventilations ventilators, which are of the Knowles type, are used under the front seats that are on the level floor, the terraced seats are provided with screened slots through which air is delivered to that section of the hall.

Due to the fact that the space under the floor is so subdivided, damper adjustment on the duct delivering air to that section was sufficient to secure a fairly even distribution over the entire seating space. The entire apparatus and air delivery is reported to be so quiet that no noise can be heard by the audience.

Temperature control of the delivered air is provided for, as well as humidity control. Humidity control is secured by a combination of tempered coil control and water temperature control. The Educator type of water heater is used.

The architects of Kilbourn Hall are Gordon and Kalber, of Rochester; and the engineering work was in charge of Allen S. Crocker, also of Rochester.

The Heating and Ventilating Magazine

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A. S. ARMAGNAC . . . . . President and Editor
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JUST a year ago this month, we received for publication in these columns, the opinions of a number of the leaders in the industry as to the general outlook. It is now worth while to review these prophecies, not only to see how closely later events vindicated the judgment of the men quoted, but also to determine whether such prophecies are of real value in furnishing a basis for future planning.

It will be recalled that all of the letters, with one exception, took an optimistic view of the situation. The one exception was by no means a pessimistic expression but rather, we should say, one that reflected an attitude of great caution. Taken as a composite picture of what the industry could hope for at the time they were written, we think there can be no question that the letters displayed a remarkable perception of the character of the forces then at work which have since cleared the way for the present business revival.

That the prophecies were by no means haphazard guesses is demonstrated in a typical comment by one manufacturer who stated that it had been his practice for years to keep a careful record of the number of inquiries received, the number of estimates and their amount, together, of course, with the amount of the company's sales. It had been found that invariably the sales curve followed the curve of estimates in dollars with approximately a three months' lag. Inasmuch as the number and amount of estimates were steadily going up, it was felt, with good reason, that the upward trend in general business was on.

As another manufacturer expressed it, the one fundamental reason for bright prospects in the heating industry was the tremendous shortage of buildings. The reports of the previous January had shown that there existed a shortage of 1,000,000,000 sq. ft. of building area, not including homes. This was based on the estimate that normal requirements in this country call for the construction of about 650,000,000 sq. ft. of building space per year. It was figured that several years would be required to make up the shortage, even when construction work was being carried on at much greater than the normal rate. It was further pointed out that the situation with regard to buildings was entirely different from that regarding most commodities which were then suffering from over-production. There had previously been an under-production of buildings due to the costs of labor and material.

Another manufacturer was able to gauge the situation through his intimate contact with over 600 representative jobbers throughout the country. This manufacturer had shortly before sent a letter to all of his customers asking for a report of stock on hand and as to the chances for future sales. The replies showed increased activity among architects and engineers, which was held to be a significant sign.

The note of caution which was expressed in one of the letters no doubt served a useful purpose in providing a check to too rosy a view. "About the only immediate prospect," commented this manufacturer, "is the carrying out of somewhat extensive programs for new schools in many of the large cities throughout the country. . . . The people generally consider that building materials and labor are not down to the point where it would be a profitable investment to enter into the construction of residences, flats and other buildings of the ordinary type. Until such time as work picks up on this class of buildings, we do not look for a very decided improvement in industrial affairs, because it is the construction of the multitude of these small buildings all over the country that lends a tremendous influence to the upbuilding of industries generally, as the spreading of wages through thousands of hands in the construction of buildings makes money available for the merchants and manufacturers."

In view of later events, this might seem to be an over-cautious view, but it must be remembered that the big impetus to construction work has gotten under way only during recent months, which lends special interest to the concluding paragraph of this manufacturer's comments in which he states, "We have practically given up any idea of seeing a marked improvement in trade conditions until next year at the earliest."

Well, "next year" is here, and while all the difficulties by no means have been surmounted, the fact remains that the comments, as published, constitute an impressive sizing up of the business prospects at the time, and to that extent have been of very real service to the industry.

DUE TO unavoidable conditions, the series of articles in preparation on "Types of Portable Unit Blast Heaters," which was scheduled to begin in this issue, has been deferred until next month. The fact that there is so little published information as to the characteristics of these appliances has inspired us to go more deeply into the subject, with a view of making such data as complete as possible.

HEATING AND PIPING CONTRACTORS' NATIONAL ASSOCIATION

Large Attendance, with Stirring Addresses on Business and Labor Feature Association's 33d Annual Convention

A HIGH-WATER mark was reached in the record of successful conventions when the Heating and Piping Contractors' National Association held its 33d annual meeting in Buffalo, N. Y., June 1-3, 1922, with headquarters at the Hotel Statler. Two addresses, one on the subject of labor unions and the extent to which their activities should be limited, and one on the changes that have come over modern business, roused the convention to a high pitch of enthusiasm. In addition the important announcement was made in the report of the association's Standardization Committee that a new set of heat transmission coefficients is about to be promulgated by the association, based upon an exhaustive analysis of those now in use.

Opening Session, June 1.

With a registration approximating 500 members and guests at the opening session, the convention hall presented an animated appearance when President John W. Danforth called the meeting to order in the ball-room of the Hotel Statler. Following the singing of "America" and an invocation by the Rev. Dr. Williams, the chairman introduced George C. Leland, secretary of the Chamber of Commerce of Buffalo.

"Buffalo," said Mr. Leland, "is undergoing a transition from a commercial to an industrial city, where, in the past, the average increase of new industries has been about fifteen per year, during the past year the number has jumped to 472 including the new $25,000,000 plant of the Dunlop company, rubber tire manufacturers." Mr. Leland predicted great things for Buffalo based upon its present record which includes 3,000 industries located within the city's limits and its freight movement of from 18,000,000 to 20,000,000 tons per year. He extended a warm welcome to Buffalo on behalf of the Chamber of Commerce which, he added, was at the disposal of the members during their stay in the city.

PRESIDENT'S ADDRESS.

President Danforth's address was a thoughtful analysis of the needs of the heating contractor for the successful conduct of his business and he placed a very high value upon the practical benefits to be derived from a policy of honesty and straight dealing.

Mr. Danforth began by echoing the welcome extended by Mr. Leland, adding that he could do this with all sincerity since Buffalo was both his home and native city and he therefore well knew its merits and attractions. The association, he said, would be 33 years old next September and he referred to the fact that the first convention, held in Chicago in 1889 was attended by 58 delegates, of which one was his father. He contrasted this showing with that made at the Boston convention last year when the total registration was 750 of which 320 were delegates. In connection with anniversaries Mr. Danforth also referred to the fact that Henry B. Gombers, the secretary of the association, was completing his twenty-fifth year in that capacity having quite recovered from the illness that incapacitated him for a time during the winter.

Mr. Danforth then pictured the Heating and Piping Contractors' National Association as bearing the same relation to the heating contractor as the American Society of Mechanical Engineers to the mechanical engineer and the American Society of Heating and Ventilating Engineers to the heating engineer. He summarized the attitude which is now being taken by the law towards trade associations. "If trade associations," he declared, "suppress competition they are illegal and in restraint of trade. But, on the other hand, a man has the right to know and be a friend of his competitor. Their relations must not be coercive or restrictive, but liberal and co-operative."

"The heating and pipe fitting business," he said, "is at best a tough proposition to handle, although it must not be thought that other industries do not have their troubles, too," As an instance he cited the losses the paper men had suffered through the depredations of the spruce bud worm. "Thank heaven," he said, "spruce bud worms don't like iron pipe!

"During the business depression," he said, "those lines of business requiring heavy stocks were hit the hardest, and this included the steel and iron industry. But conditions," he added, are improving," and he quoted recent comments of a number of leaders of industry all expressing the view that we are on the way to more stable conditions.

"I feel, personally," declared Mr. Danforth, "that building material prices are as low as they are going. In fact, I expect to see them increase with a scarcity of labor." He therefore urged the members not to load up with cheap work.

ELEMENTS OF SUCCESS IN HEATING INDUSTRY.

President Danforth epitomized the elements of success by saying that in order to succeed the head of a concern in the heating line must master every detail of the business. He must keep up especially with the ever-changing cost of materials. There is no other line, he said, of which the public knows so little. The public, as a rule, cannot tell the difference between good and poor workmanship. Finally few people know how to operate a complete heating plant.

"Put in the job what is specified," urged Mr. Danforth, "and you will be surprised to see the way your business builds up. Keep keenly alive to your contract obligations to customer, manufacturer and workmen—live up to 30% and 10% as you expect 90-day payments as the job is being completed."

Summarizing the elements of success, Mr. Danforth listed them as (1) knowledge of the business, (2) confidence of the customer and (3) a keen conscience.

"The man who takes a job at cost," he said, "finds it hard to be honest. Get a proper price for the work and be able to give the service."

He then gave a picture of the life of a heating contractor who makes a practice of bidding too low and he declared:

"You can't play the game alone."

TRADE PROTECTION POLICY ENDORSED.

In closing, Mr. Danforth vigorously defended the association's policy in regard to trade protection as embodied in its resolutions on the subject. "Manufacturers," he said, "do not need trade protection, nor do professional men or doctors because if we need their services we naturally go to them. "If you want to buy a heating system," he said, "you should go to a heating contractor. The history of American business has established the right of the middleman to trade protection. In the heating line this association is the legitimate means of securing such protection. We must press forward towards this goal in influence and financial strength."

Before the session adjourned the following convention committees were announced:

Credentials: F. S. Spencer, Minneapolis, Minn., chairman.
Auditing: J. T. Dyas, New York, chairman.

Appeals and Grievances: B. L. Sheldon, St. Louis, chairman.

Distribution of Reports: H. W. Jones, Rochester, N. Y., chairman.

Nominating: John E. Rutzler, New York, chairman; R. T. Wray, Chicago; Noble P. Bishop, New Haven, Conn.; Walter Klie, Cleveland, O.; and John R. Sheehan, Schenectady, N. Y.

Resolutions and Association Improvement: Stewart A. Jellett, Philadelphia, Pa., chairman; Edmund Grassler, Milwaukee, Wis., H. D. Smith, Pittsburgh, Pa., William H. Driscoll, New York, and R. F. Parks, Fitchburg, Mass.

Reception: Board of directors and chairmen of standing committees.

Afternoon Session, June 1.

Frank A. Merrill of Boston presented the report of the Board of Directors. The association, said the report, has held its own during the past year in spite of the general business depression. Its financial condition is especially satisfactory, its net assets amounting to more than $30,000. The association has renewed its subscriptions to the Research Laboratory of the A. S. H. & V. E., the National Trade Extension Bureau and the Chamber of Commerce of the United States.

No new legislation, stated the report, has been enacted during the past year seriously affecting the heating trade. The effort to get a bill before Congress providing for separate contracts on government work is still under way and has also the support of the National Association of Master Plumbers.

A committee, said the report, has been engaged in revising the association's by-laws. This committee reported later at one of the executive sessions and the by-laws were changed to a considerable extent.

Referring to the subject of apprentices, the report stated that a committee was still studying this question. The present situation of the helpers, it was stated, is not conducive to the replacing of men. The unions are not permitting helpers to affiliate with the unions. They can, therefore, eliminate the helper whenever they see fit as he has no voice in the union's affairs. It seems to be the union's purpose, said the report, to restrict the number of mechanics in an effort to secure higher wages. A properly regulated apprenticeship system is needed together with a set of rules to serve as a guide in the employment of apprentices. Such rules, it was added, should be sent to all the local associations to be put into effect.

Efforts towards coöperation with the journeymen's association, said the report, in drawing up a set of principles, had not gotten very far due to the failure of the journeymen to take action on the matter at their convention. This, it was stated, was all the more surprising as the matter had been initiated by the journeymen. However, it was recommended that the conferences with the journeymen's representatives be continued.

The association's Standardization Committee, said the report, had been doing some important work and had prepared data for estimating radiation, pipe sizes, etc. Some of the advance sheets are already out and more are in preparation.

Following the report of the Board of Directors, Charles K. Foster, vice-president of the American Radiator Company, extended an invitation to those present to visit the Company's Institute of Thermal Research where opportunities would be afforded to make any special tests desired. He took advantage of the opportunity to say that he classed heating with the three fundamental requirements in life—health, raiment and warmth. He felt that there was plenty of opportunity in the business for all and that the slogan should be to promote, rather than to grab, business.

An announcement that George H. Reynolds, formerly secretary of the association and one of its organizers, was in feeble health at his home in Chicago, led to the passage of a resolution extending the greetings of the association to Mr. Reynolds who is 83 years old.

ADDRESS ON THE LABOR PROBLEM

President Danforth announced as the principal speaker of the afternoon session, Walter Gordon Merritt, counsel for the League for Industrial Rights. Mr. Merritt's subject was "History of the Development of the Law on the Labor Problems."

The interlocking activities of society make trade associations necessary, declared Mr. Merritt, if we are to avoid external regulation. "You are not able to do what you should for your fellow men unless you organize. Through your organization you are doing those things which cannot be done by the government and which result in harm if they are not done."

Mr. Merritt divided labor legislation into two classes, first, the laws providing for better hours and amelioration of abuses and, second, that body of legislation which seeks to clothe certain bodies of workmen with power to coerce others. Recent Supreme Court decisions, he said, were having a salutary effect on these sinister tendencies and he felt that the country was going forward on a far more satisfactory basis, with the idea again prevailing of individualism, rather than compulsory collectivism.

Trade associations, he said, must be voluntary and not involuntary, coöperative and not coercive. He pleaded for a collectivism which will supply the needs of trade and not suppress them. He contrasted labor conditions in this country with those in England where compulsory unionism is the rule and declared such economic power to be dangerous.

Mr. Merritt struck a responsive chord when he stated that one form of amendment needed to our anti-trust laws was that if the employers filed an announcement of their plans with one department of the Government, such as the Federal Trade Commission, the visé of that body should act as an endorsement of their policies until the courts ruled otherwise. This, he said, will remove the present feeling of doubt which no lawyer at present can dissolve.

Mr. Merritt also proposed legislation against unwarranted industrial warfare such as strikes in violation of agreements, strikes to prevent or terminate employment because a worker is non-union, and strikes on public improvement work if the employers are willing to arbitrate. At the same time Mr. Merritt admitted the justice and force of the strike idea when properly applied.

In concluding he told of the organization of the American Construction Council which has been formed in Washington to improve industrial conditions and stated his belief that if the council would first work out those problems which are not controversial, it might then take up with success the broader plans on its program.

The open session concluded with the report of Secretary Gombers.

Morning Session, June 2.

A stirring address by Harry Collins Spillman opened the Friday morning session, his subject being "Adjusting Ourselves to a New Era in Business." Mr. Spillman said that as in the days of Greece's glory the dominating idea was beauty, in Roman days, militarism, in the Middle Ages, religion, and during the Renaissance period, art and beauty, so during the past 100 years the world has revolved around the mechanical idea. We have come to know so much about horsepower that we know too little about men. In the future, he declared, more thought will be given to man power because as an industrial nation we will be a going concern in relation to man power.

No organization is more successful than the degree of the growth of its men.

In the days of the wagon there were but five points of contact to look out for in its lubrication. Today with the automobile there are multiplied points of contact. Commerce, declared Mr. Spillman, has undergone the same kind of change. We touch our customers in many more vital places than formerly.

Mr. Spillman said the needs of the day were courage and faith, and cited the story of the man who was asked why he did not get as much business as he expected. "Well," was the answer, "I didn't expect to." The speaker urged his hearers to go out after the big things in life and not be satisfied with the small things.

His address was forcefully delivered and as he concluded he was given an ovation.

Thirty-Second Annual Convention of
Heating and Piping Contractors National Association
Held in Buffalo, New York May 31-June 3 1922 Hotel Statler

CONVENTION PHOTOGRAPH, HEATING AND P IPING CONTRACTORS' NATIONAL ASSOCIATION.

REPORT OF STANDARDIZATION COMMITTEE

Before the meeting went into executive session the report of the Standardization Committee was presented by W. L. Fleisher, chairman. Mr. Fleisher told of the work that had been done by the committee in analyzing the heat transmission coefficients in common use, especially the so-called Jones Tables, published by THE HEATING AND VENTILATING MAGAZINE. His committee, which included M. L. Crowell of Cleveland, Ralph S. Franklin of Boston, Harry M. Hart of Chicago, E. W. Mandeville of New York and S. Austin Pope of Chicago, has drawn up a new set of coefficients for use with the following tentative formula:

TENTATIVE FORMULA FOR SQUARE FEET OF RADIATION REQUIRED

Square feet = (W+G+R+1) × (Radiation factor) × (Temperature Factor)

in which

W=Net area of wall (sq. ft.) × K (transmission coefficient) × 70

G=area of glass × K × 70.

R=area of roof × K × 70.

1=lineal feet of crack × (wind and exposure factor in cubic feet per hour × 0.018 × 70.

Radiator Factor = transmission of 3-col. 38-in. radiator, 1 lb. steam pressure, 70° F. room temperature. Also transmission of other design, 1 lb. steam pressure, 70° room temperature.

Temperature Factor=Factor for 70° room temperature, zero outside. Also factor for other conditions.

Radiator factors for 70° F. room temperature and 1 lb. steam pressure: wall coils, 300 B. T. U.; ceiling coils, 225 B. T. U.; double wall coils, 250 B. T. U.; all wall radiators, 275 B. T. U.; ceiling wall radiator, 225 B. T. U.; double wall radiator, 225 B. T. U.; standard radiator (3-col. 38-in.) 225 B. T. U.

These tables will soon be published by the association.

Mr. Fleisher said that in view of this work it was felt by the Board of Directors that the tables might take the place of the proposed code for testing heating systems which the association has asked the A. S. H. & V. E. to draft. If it could be shown, for instance, that a given heating system had been laid out in accordance with this radiation rule, it might prove as satisfactory to the customer as a formal test.

Morning Session, June 3.

At the concluding session Saturday morning, the new officers were elected and installed as follows:

President, George M. Getschow, Chicago, Ill.

Vice-President, J. B. Walker, Pittsburgh, Pa.

Treasurer, Frank Howard, Boston, Mass.

Directors: M. L. Crowell, Cleveland, O.; W. H. Driscoll, New York, and Mr. Volk, Milwaukee, Wis.

At this session a surprise was sprung upon Secretary Gombers when Stewart A. Jellett of Philadelphia secured the floor and presented him, on behalf of the association, with a mahogany mantel chime clock, in recognition of his silver anniversary as secretary.

Buffalo Organization Provides Delightful Entertainment.

An entertainment that was characterized as one of the most delightful in the history of the association was provided by the Buffalo organization, under the leadership of George H. Drake, general chairman. The social functions included an automobile trip for the ladies through the park system of Buffalo, on Friday, the second day of the convention. This was followed, in the evening, by an informal dance in the ballroom of the Statler. This was opened with a grand march, led by President and Mrs. Danforth, amid a shower of confetti.

The big event, however, was reserved until Saturday when the entire party took in the Niagara Falls trip. Arriving at Niagara Falls the party was first taken down the Gorge by trolley, winding up at the Clifton House on the Canadian side. Here dinner was served and later the visitors saw the Falls illuminated.

Other events on the entertainment program were luncheons and theatre parties which filled almost every available minute for the large delegation of ladies present.

General Chairman George H. Drake was assisted by a staff composed of E. H. Monin, in charge of registration; W. G. Fraser, reservation; John J. Bresnahan, entertainment; Frank G. Lane, transportation; L. N. Hopkins, ladies; N. L. Danforth, finance; and J. B. Ruckel, publicity. At the registration desk, in addition; were Miss Emma C. Donohue, Crane Co.; Miss Vera Jackson, E. H. Monin, Inc.; Miss Hilda V. Rudio, Power Efficiency Corporation; Miss Cora L. Machemer, American Radiator Co.; C. W. Cox, Crane Co.; and E. H. Fisch, W. A. Case & Son Mfg. Co.

The presence of W. G. Le Compte of Jenkins Bros., New York, and J. Barton Garfield, of the American Radiator Company, who served on the entertainment committee, added an old-time touch to the convention that was greatly appreciated by the ladies,

SERVICE DEPARTMENT

Data on Air-Line Vacuum Heating System.

QUESTION: I am sorely in need of data on air-line vacuum systems, sizes and probable cost of electric pumps, proper pipe sizes for air line, etc., etc. Am thinking of "converting" one or two old gravity jobs.

ANSWER: In order to discharge air from the radiators in an ordinary steam heating gravity system, the steam must be at a pressure above atmosphere. As a consequence, when the fire dies down, or when the fire is banked and the pressure drops, only those radiators which are near the boiler are entirely or partially filled with steam. Radiators farther away may be cold, making the heating uneven throughout the building. Furthermore, the odor of air discharged, together with its attendant noise, steam and water leakage, is annoying.

To overcome those objections, the radiators in a heating system are sometimes equipped with special air-line valves (instead of the ordinary type of air valve), and from these, small pipe lines are connected for air removal, hence the name, "air-line systems" (Fig. 1). All other piping remains the same as in the usual steam heating gravity system, having either one or two-pipe radiator connections.

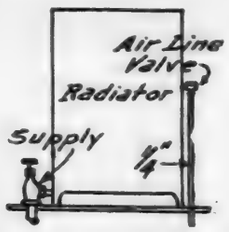


FIG. 1—TYPICAL RADIATOR CONNECTION FOR AIR LINE IN ONE-PIPE SYSTEMS.

In an air-line system where it is desired merely to eliminate the annoyance of air valve discharges, no means is provided for forming a vacuum within the air removal piping. When, however, it is desired to induce a more positive and rapid flow of air from the radiators, either a vacuum pump or steam or water ejector (Fig. 2) is installed so as to suck on the air line piping, and maintain by means of an automatic regulating device, a vacuum of from 6 to 12 in. in the system.

TYPES OF EXHAUSTERS USED.

In heating systems having less than 2500 sq. ft. of direct radiation, the vacuum pump is of the direct-acting piston type,—water driven, and the water pressure must be over 20 lbs. per square inch, though with city water pressures ranging from 15 to 20 lbs., a pump can still be used, if of one size larger than that required at 20 lbs. In larger systems a high-pressure steam jet (ejector) is used with a velocity at the jet of 900 ft. per second, or, with no steam available, the pump may be electric driven with a motor of about ¼ H. P. duplex installations are used in large plants where a reserve unit is desired for continuous service (Fig. 3).

The steam used by ejectors varies widely and may be anywhere from 1 to 5% of the total condensation from radiators. For instance the Ohio State University made a test that gave 432 lbs. of steam per 8,160 lbs. of condensate, or about 5%. However, this steam can often be used in a radiator for heating, or saved for other utilization.

EQUIPMENT NECESSARY AND COST OF A COMPLETE AIR-LINE OUTFIT.

The equipment furnished as a necessary part of an air-line outfit consists usually of an electric motor with leather belt, silent chain, or spur gear running in an oil bath, together with switchboard, cutout switch, automatic vacuum controller, and vacuum gauge, all self-contained, wired and connected up complete (Fig. 4).

An expansion tank is used with the larger pumps, together with an automatic arrangement for discharging from the tank to a convenient sewer the incidental condensation leakage. Air

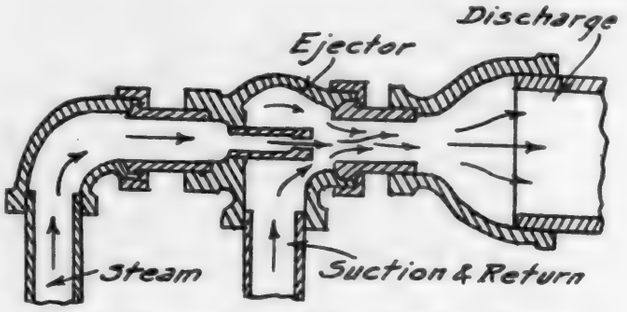


FIG. 2—STEAM EJECTOR FOR AIR-LINE SYSTEM.

line piping terminates with its connection to this tank and the exhaust from the pump is connected into a chimney or is run to a point convenient for its discharge outside of the building.

The approximate cost of such outfits is given for two different and well-known makes in the following table.

Capacity Sq. Ft. Direct C. I. Radiation	Net Cost-Dollars F. O. B. Factory.
3000	165.00
4000	180.00
7500	300.00
5000	224.00
8800	259.00
15000	307.00
24000	448.00

Air-line valves are in general made with ¼-in. connection, nickel plated, and fitted with union couplings. They should be installed, not only on each radiator, but also on the ends of steam mains, as shown in Fig. 5-6. The net cost of these valves, if of high grade, ranges from $1.80 to $2.10 each.

OPERATION OF AIR-LINE PUMPS.

Fig. 7 shows one well-known type of electric-driven air-line pump in end view with end plate removed so as to illustrate its

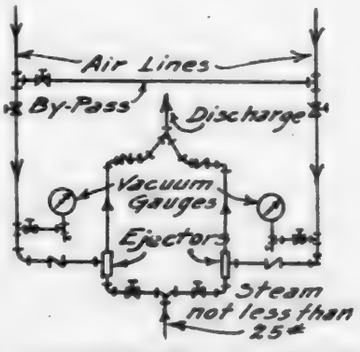


FIG. 3—ARRANGEMENT OF EXHAUSTERS IN DUPLICATE.

method of operation. Unique in design, and simple in construction, it has also the interesting features of being valveless and almost frictionless, operating with a rolling motion,

though the impeller does not revolve. The small axis of the impeller is the only portion of the pump that does revolve. No water or oil seal is required.

In operation, an air-line pump is automatic, maintaining a partial vacuum in the air-line piping, which at certain times (as when the pressure of the steam in the boiler drops) extends throughout the entire system, radiators, boilers and piping. This reduces the boiling temperature to the pressure existing so that steam is still generated after the fire is banked.

When firing up in the morning, the pump should first be placed in operation by throwing in the cut-out switch left open when the fire was last attended to the evening before. The air will thus be quickly drawn from the radiators and the steam circulation accelerated.

As each radiator is filled with steam, the air-line valves close and the vacuum increases in the air-line piping until the automatic vacuum controller cuts out the motor and stops the

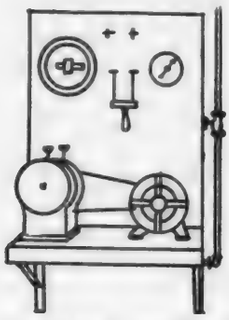


FIG. 4—COMPLETE ELECTRIC-DRIVEN AIR-LINE OUTFIT.

pump. The pump will then remain idle until enough air enters the system to lower the vacuum and throw in the motor.

ADVANTAGES OBTAINED BY THE USE OF AN AIR-LINE PUMP.

The advantages gained by the use of an air-line vacuum pump make it a valuable addition to any air-line system, new or old. In freeing the radiators and piping from air, it improves the circulation and provides more even heating, exciting a more rapid and positive steam circulation by reducing the air resistance. This lightens the load to some extent upon the boiler and the entire plant is benefited thereby. The radiators warm up more quickly and hold their heat longer.

Air-line systems are adapted to compact plants like office buildings where the area is small as compared with the cubic

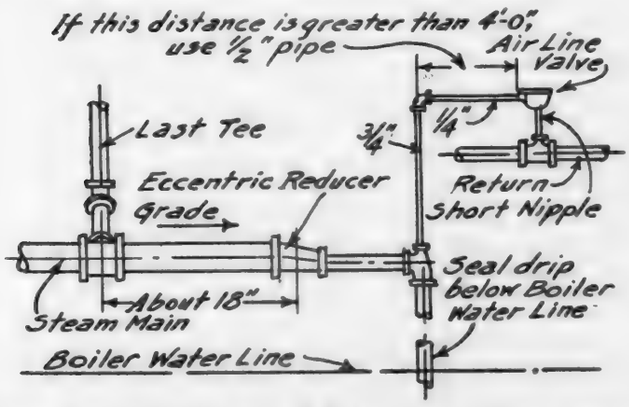


FIG. 5—METHOD OF VENTING WHEN END OF STEAM MAIN IS CONNECTED TO A CONVENIENT POINT TO BE DRIPPED INTO WET RETURN.

contents. There is, however, no advantage obtained by the use of an air-line system which is not possessed by a well-designed gravity steam or vapor heating system having ample pipe sizes, in particular where a system of automatic temperature regulation is used.

PROPER PIPE SIZES TO BE USED.

One difficulty with air-line systems is stoppage due to small size of air lines, so that some engineers advocate for this class of work the extreme in pipe sizes, even as much as ½-in. for all piping from air-line valves to connections with basement mains. This is done partly to prevent stoppage of pipes from interior corrosion as the system ages, and partly to prevent

FIG. 7—SECTIONAL VIEW OF AIR-LINE VACUUM PUMP.

mechanical injury to these pipes, as sometimes occurs with pipes of smaller size. However, stoppage of pipes is more apt to take place in systems where the lines discharge merely to a chimney and no positive means of exhaust is obtained, as with a pump. Some systems work successfully even with air lines from each air-line valve to riser connection of only ¼ inch in size, but this is the other extreme. In general, it is best to limit the use of ¼-in. pipe to the vertical drop from the air-line valve, increasing the horizontal branch to the riser to ⅜ in. Risers are usually made ½-in., and mains in the basement, 1-in.

GRADING AND ARRANGEMENT OF AIR LINES.

Air lines are not shown on drawings, but nevertheless should be graded so as to eliminate all water pockets, running each as direct as possible. They should, in general, follow steam mains in the basement, and be run elsewhere the same as the steam piping; horizontal runs from air-line valves being laid in the floor construction and connected to risers or to mains at the ceiling below.

It is a good plan to arrange the radiation in groups, running the air lines separately and valving each at the exhauster. Steam mains should be valved in the same manner, though the valves need not be centrally located. This arrangement allows the return valves to be adjusted for proper flow from each group.

Pipe and fittings are galvanized, with pipe ends reamed after cutting, and joints made up with asphaltum. Painting of lines

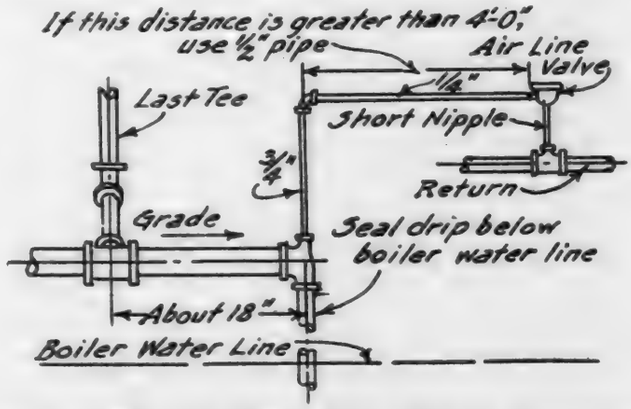


FIG. 6—METHOD OF VENTING WHEN END OF STEAM MAIN IS DRIPPED DIRECTLY INTO WET RETURN.

is advisable, but not covering. Pipe hangers, ceiling plates, and the like, should be used the same as for other pipes.

TESTING THE SYSTEM.

Upon completion of the air-removal system, it should be tested by running the pump until a vacuum of 7 in. is obtained.

The pump should then be stopped and the vacuum maintained for one hour without a decrease in vacuum of more than 2 in. Openings between steam and air lines should be closed.

Concealed piping, before being closed in, should be tested and stay tight under a hydrostatic pressure of 80 lbs. to the square inch.—T. W. Reynolds.

CORRESPONDENCE

Trouble with Water-Logged Pipe Coils.

Editor Heating and Ventilating Magazine:

Permit an old pipe man to say he thinks the discharge of water from the two coils described on page 47 of your April issue, is caused entirely by the fact that the coils condense much water which is thrown into the return manifold from each pipe. It then descends in spirals inside the return manifold and floods across the air valves which then must run wet.

The remedy I have used in cheap and effective. Plug the present air valve and tap the top of the return manifold, then extend the air pipe down inside about two thirds of the distance. This always worked for me dry as a bone. Perhaps, if the air tube could be extended into the present tap so as to get to the center of the manifold horizontally, it might cure the weeping both of the air valve and the fitter. He must so space it that a direct flow from a radiator pipe doesn't flood its ends, or he will have disappointment.

If he could lay the coils flat, he would also stop the trouble, but I suppose they are against a wall and not suspended overhead. This would work dry, as water could not descend in spirials in manifold.

J. G.

Norristown, Pa.

Features of the "Ready-to-Serve" Charge in Steam Heating.

Editor Heating and Ventilating Magazine:

Mr. Walker's correspondence regarding the writer's paper on the "Ready-to-Serve Charge in Steam Heating" is of value in that it opens up another side of the maximum demand problem.

While the various methods of figuring this charge are, in principle, wrong simply because they are thumb rules and are only approximately correct for a very small number of the cases to which they are applied, the actual damage to the customer is small when the proportional share of the bill is considered.

There is, nevertheless, another side which Mr. Walker has not mentioned. That is brought out in the last paragraph of the article in question. The customer believes that the radiation figured for the ready-to-serve charge is the radiation which should be installed. Many utility representatives and engineers also insist that until all of the radiation figures are installed, no service will be rendered. The actual result is that the customer, who leans largely on the utility company for advice as to needs, installs much more radiation than is needed. Results are found in excessive bills which cause discontent, an extra large outlay for installation, and temperatures which are much too high. The latter results lead to sickness of help and decreased production.

M. C. W. Tomlinson.

Springfield, Ohio.

Heating and Ventilating the New Chimney Building at Cornell University.

Details of the system of pipe installation in the Chemistry Building, at Cornell University, are given in the current number of the *Sibley Journal*.

Steam will be supplied by the university heating station, and the pipes will enter the building from the south. Two pipe inlets are being installed, a low-pressure and a high-pressure line. The low-pressure steam will be used for heating purposes and the high-pressure steam will be used in connection with the ventilating system.

These inlet pipes pass through a tunnel beneath the basement corridor; this tunnel is the width of the corridor and about 4½ ft. high, and circles the entire building. At the four corners of the building, connections are to be made to these inlet pipes, and the steam is led to the top floor from which it is distributed to the lower floors.

This floor-connection idea makes it possible to supply steam to the rest of the building should one section of the line become out of order.

Besides the steam lines, the tunnel also contains the gas, sewerage, and electrical lines. These pipes are arranged in tiers, and rest on I-beams suspended from the ceiling. The tunnel arrangement allows for exposure of all pipes, which can be easily replaced if needed. It is also wide enough for removal of pipe drains which protrude through the walls.

The ventilation system in the laboratories is to consist of air ducts over the hoods which draw up the foul air to the attic by means of exhaust fans. These exhaust fans are to be provided with individual discharge pipes so that different gases can not combine and cause an odoriferous or explosive mixture. It is interesting to note that each room is to be provided with a separate exhaust fan, electrically driven, and remote controlled from the respective class rooms. There will be over 70 of these fans installed in the attic.

The fresh air intake supply is first to be heated by being brought into contact with Vento stacks and is then to be led over the building between the floors and a partition which may be called the "suspended ceiling." The high-pressure steam used in connection with the Vento stacks is later to be utilized to heat the water used in the building.

D. B. MacDonald '13, is the engineer in charge for the Taylor Co.

Heating Requirements for Drying Rooms.

Question: Can you give us the size of boiler suitable to care for the following conditions: Three drying rooms, each 7 ft. wide by 17 ft. long by 7 ft. high, side by side. In each drying room are 30 heating pipes, 14 ft. 3 in. long by 1-in. diameter. One room to be heated to a temperature of 200° F., one to 150° F. and one to 125° F. The rooms are of brick construction with 16-in. thick walls and ceilings. 3-in. doors are located at each end, these doors being opened about once every four hours. The boiler would be used during the late Spring, Summer and early Fall when the main plant will be shut down. We might add that these drying rooms are installed within the main plant and are not exposed to the outside.

Answer: Heating the three drying rooms mentioned, one to 200° F., one to 150° and the third to 125°, will require 72 lbs. of steam per hour without taking care of any drying of material. It is based on an outside temperature no lower than 30° F. It is therefore recommended that a boiler be installed having a capacity for generating 150 lbs. of steam per hour, so as to take care of the drying of material, together with the transmission losses in the dry rooms, also that from the piping to and from the boiler. This capacity is figured for a boiler operating at approximately 5 lbs. pressure. — E. Nesdahl, chief engineer, Atmospheric Conditioning Corporation.

NOTES ON CHICAGO PRACTICE IN HEATING AND VENTILATING SCHOOL BUILDINGS

Some of the methods followed in heating and ventilating Chicago public school buildings are discussed in an interesting manner in an article on "Temperature and Humidity in our Class-Rooms," by John Howatt, chief engineer of the Chicago Department of Education, which appears in the current issue of the *Chicago Schools Journal*.

"The outdoor relative humidity in Chicago," says Mr. Howatt, in the course of his article, "is comparatively high, averaging between 60% and 70%. The local Weather Bureau Office takes three humidity readings daily; one at 7.00 A. M., one at noon, and one at 7 P. M. Ordinarily, the relative humidity is highest in the morning, is lowest at noon, and rises again toward evening.

"The average outdoor temperature in Chicago during the winter season in the day time is 20° F. Assume, therefore, an outdoor temperature of 20° and an outdoor relative humidity of 50%. At 20° temperature, 1 cu. ft. of air is capable of holding 1.2 grains of moisture; at 50% relative humidity, therefore, it will have 0.6 grains of moisture. This cubic foot of air is taken from outdoors into the heating and ventilating system at one of our school buildings and delivered into a classroom with a temperature of 70°. If no additional moisture is added to that cubic foot of air, it will still have its 0.6 grains of moisture, but it will have a temperature of 70°, instead of 20°, and would have less than 10% relative humidity.

"A cubic foot of air at 70° holds 8 grains of moisture at saturation; we attempt to maintain 40% relative humidity in our classrooms, so that at 70° temperature and 40% relative humidity, each cubic foot of air will contain 3.2 grains of moisture. We had 0.6 of a grain brought in with the outdoor air so it is necessary to artificially add the difference between 3.2 and 0.6 or 2.6 grains of moisture per cubic foot in order to provide a 70° temperature and 40% relative humidity condition.

"We are conditioning and handling in this way approximately 10,000,000 cu. ft. of air in the Chicago public school system every minute from 7 o'clock in the morning until 3 o'clock in the afternoon, every day of the heating season. That means that a total of 26,000,000 grains of moisture must be added every minute under the conditions outlined. Approximately 1,500,000 grains of moisture are discharged every minute from the lungs of the 400,000 public school children; that leaves about 3,500 lbs. of water vapor that must be added to the air in the ventilating system by other means. This is but one of the jobs of the engineer-custodian at a school building. The conditioning of this volume of air requires the combustion of approximately 150,000 tons every season."

CENTRAL SYSTEM OF HUMIDIFICATION ADVOCATED.

Further on Mr. Howatt says: "In considering the humidification of air in our classrooms, a word on the method of humidification may be of interest. In any central system of ventilation, such as is used in our school system, a central system of humidification is the simplest. There are three central station methods of introducing moisture into the air in common use. The first is by means of an air washer.

"The second method of humidification consists of open pans in the ventilating chamber in which the water is boiled by means of high-pressure steam coils. The rate of boiling of the water, which determines the rate at which the vapor will be given off, is controlled by diaphragm valves and humidostats the same as in the air washer type of humidification system. This has the advantage of always discharging pure water vapor in the air.

"The system used in the Chicag public schools consists of the injection of water vapor direct into the air chamber by means of perforated steam pipes, the supply of steam to them being controlled by a diaphragm valve just as in the other systems named. This is the simplest and most direct method of adding moisture to the air and is not objectionable where water is pure as it is in Chicago, and where boiler compounds, giving steam unpleasant odors, are not required in connection with boiler plant operation.

"A practical indication of the relative humidity in a classroom is the moisture precipitation on the windows. With a relative humidity of 40% and a classroom temperature of 68°, a moisture precipitation should take place on the window panes when the outside temperature is 20° or less. In fact, it is moisture precipitation on windows and outside walls that limits the relative humidity in classrooms, from a practical standpoint, to 40%. Experience has shown us that if the humidity is carried any higher there will be an excessive moisture deposit on outside walls and windows which ruins decorations and is otherwise objectionable.

INDOOR RELATIVE HUMIDITIES HIGHER THAN 40% ADVOCATED.

"Temperature and relative humidity have been considered here only from a comfort standpoint, but medical authorities have made extensive studies and report that the health curve follows very closely the comfort curve. I am of the opinion that when the outdoor weather conditions will permit it, a relative humidity higher than 40% would be more healthful.

"When air is drawn into the lungs, it passes through a rather complete air sterilization system; it first encounters moist hair in the nostrils which stops all of the large particles floating in the air; it is then carried through a tortuous passage, the inner surface of which is lined with moist mucous membrane. This membrane catches and holds all of the dust in the air.

"We know that most of the bacteria ride in the air on the dust particles; the bacteria, therefore, are held by this mucous membrane, so that expired air is almost sterile and free from dust and bacteria. If the relative humidity is low the temperature has to be correspondingly higher for comfort; this means that when air is drawn into the nostrils, the evaporation of moisture from the air passages will be excessive, reducing the power of these membranes to hold the dust particles.

"An increase in temperature and lowering of humidity, moreover, result in an increase in the number of dust particles. Therefore, the air passages have more work to do in the elimination of dust in the air and have their power to do it reduced.

"It is logical to assume, therefore, that a higher humidity up to a certain point is more healthful, but we are limited in the amount of moisture we can carry in the air in our classrooms by the condensation on outside walls and windows and by an unpleasant clammy feeling of the clothing."

Representations as to Cost of Heating by a Boiler Held Mere Expressions of Opinion.

Action was brought for balance for the installation of a gas-fired boiler for heating the defendant's house. The latter brought an action in tort, in which he alleged that he was induced to enter into a contract for the installation of the boiler by reason of the representation made to him by the gas company's agent that the cost of heating his house therewith would be reasonable; that he relied on this representation, and that it was false. The actions were tried together.

The Massachusetts Supreme Judicial Court held, Boston Consol. Gas Co. v. Folsom, 130 N. E. 197, that the written agreement for the installation was on its face complete and unambiguous, so that it could not be varied or controlled by parol evidence.

No express warranty appeared in the contract, and none could be imported into it by implication, by the introduction of parol evidence. If a warranty such as the buyer claimed had been intended, it should have been inserted in the contract. The evidence showed that the buyer obtained exactly what he contracted for, namely, a gas-fired steam boiler, installed and equipped as the contract provided. There was no stipulation in the agreement that it could be operated economically, or would furnish any definite amount of heat, or that it could be operated for a fixed sum. Nor was there an implied warranty that it was fitted and suitable for the purpose for which it was installed. There was no evidence to show that the buyer was induced to enter into the agreement by any false representations of the seller or its servants or agents; the representations relied on by the buyer were at most only expressions of opinion, judgment, or estimate, upon which he could not rely as a ground for rescission of the contract.

In the second action the buyer testified that before the contract was signed the seller's agent told him in substance that the boiler would not cost much, if any,

more to maintain than he had been previously paying for heating his house; that the agent stated "that he was pretty confident that it could be done for about the some" cost as the buyer had previously paid; and that other similar statements were made by the agent. There was evidence that the cost of maintaining the boiler was much in excess of the amount previously paid for the purpose by the buyer. It was held that the statements so made, if untrue, were not representations of material facts, but were merely matters of opinion, judgment, or estimate, which would not sustain an action of tort.

Evidence as to the price paid by the buyer for a new boiler after that in question had been removed was held immaterial upon any issue involved. Correspondence between the parties after the contract was made and the boiler installed could not affect the rights of the parties and was properly excluded. Exceptions to a directed verdict for the seller in the second action were overruled.

WHAT THE HEATING ENGINEERS' RESEARCH LABORATORY IS DOING FOR THE INDUSTRY

BY F. PAUL ANDERSON, DIRECTOR.

Since the establishment of the Research Laboratory of the American Society of Heating and Ventilating Engineers there has been an increasing number of pieces of research work undertaken and completed. The laboratory is fortunately situated in the environment of the Bureau of Mines. The human element finds expression in mathematicians, physicists, chemists, draftsmen, tool and instrument makers, photographers and scientific observers of many varied talents. There is available almost every conceivable kind of energy and material.

The Bureau of Mines, through its large power plant, furnishes all sorts of electric current, compressed air, steam at any pressure and gas. The Research Laboratory has at its command facilities that would represent an expenditure of many thousands of dollars a year and the heating and ventilating fraternity should be under everlasting obligations to the officers of the Bureau of Mines who have made it possible to carry on this very effective co-operative work.

The present personnel of the laboratory, supported by the funds direct, are: Director F. Paul Anderson. Research Assistants, O. W. Armspach, F. C. Houghten, P. Nicholls, C. P. Yaglaglou and M. Ingels. The clerical force of the office consists of a secretary and a stenographer.

With this small personnel we have the co-operation all the time of at least ten investigators from the Bureau of Mines, giving us at the present time a total of fifteen research assistants working on problems that pertain almost exclusively to the heating and ventilating art.

The laboratory's facilities, including the psychometric room, are handsomely appointed for most careful research. In order to form an adequate conception of this center of scientific study, it is necessary for a person to perceive through his own eyes, processes employed in determining basic laws of permanent value to the engineering profession and especially to those persons concerned with heating and ventilating.

In addition to the work of the laboratory, there are in process in twenty universities of the country, lines of research work laid out in detail by the personnel of the Research Laboratory at Pittsburgh. There are at least forty men outside of the main laboratory who are seeking faithfully and diligently for some of the truths pertaining to the work of the heating and ventilating engineer. At the present time the following investigations are being carried on:

TEMPERATURE, HUMIDITY AND AIR MOTION EFFECTS ON HUMAN HEALTH AND COMFORT.

The laboratory personnel is being assisted in this work by three physician scientists who have been assigned to the laboratory for this particular work by the Surgeon-General of the United States. The physiological changes taking place in the human body are being studied with more comprehensiveness than has ever been done in similar research. Within the next sixty days there will be some results obtained that will be of decided interest, not only to the engineer but to the medical fraternity in general. At the present time twenty human subjects are observed in these investigations.

THE STUDY OF THE INFILTRATION OF AIR IN BUILDINGS IS BEING CARRIED ON IN SIXTEEN UNIVERSITIES.

In order to make the results comparative in all of these centers of study (under instructions that have been issued by the laboratory), many able scientists are finding out how air leaks in buildings of varied construction and type.

THE STUDY OF THE CRITICAL VELOCITIES IN THE VARIOUS ELEMENTS ENTERING INTO THE DIRECT RADIATION STEAM HEATING SYSTEM.

In the Fuel Section of the Bureau of Mines, there is in continuous operation apparatus affording every facility for the determination of absolute flow of steam and water throughout a wide range of temperature and pressure. Apparatus similar in character for determining critical velocity constants has been set up at the Carnegie Institute of Technology, Brooklyn Polytechnic Institute, the University of Kentucky and the State College of Washington.

THE STUDY OF HEAT TRANSMISSION AND COMBUSTION IN HOUSE HEATING BOILERS.

The Fuel Section of the Bureau of Mines is carrying on a very comprehensive series of investigations on existing types of boilers and on special arrangements with varied relations of heating surface and grate area in special forms of boilers. The object of this particular investigation is to finally present to engineering literature an ideal condition of combustion for every commercial fuel.

THE STUDY OF PRESENT METHODS AND THE DEVELOPMENT OF A NEW ONE FOR MEASURING DUST.

This research problem involves not only the study of air washing but involves an absolute mode for measuring dust. The present methods of dust determination are inadequate. It is the purpose of the laboratory, if possible, to develop an entirely new method for registering the relative amount of dust in any atmosphere.

THE STUDY OF THE VALUE OF OZONE IN VENTILATION.

The rapidly increasing use of ozone in ventilation has made it imperative that some authenticated effects of ozone in air purification be determined. This work is being carried on very largely by the chemists and physiologists of the Bureau of Mines and the United States Public Health Service in co-operation with the Research Laboratory of the American Society of Heating and Ventilating Engineers.

HEAT TRANSMISSION INVESTIGATIONS.

At a recent meeting of the National Research Council to consider establishing a central committee for the work, we submitted a survey of the existing data and present needs of this branch, and suggestions for future work which we believe would more quickly help the profession.

In our own laboratory we are undertaking the development of thermal transmission meters, as our facilities here permit of greater accuracy of work than is usually found. With the help of these instruments we will be able in the future to obtain transmission values from existing structures, a feat which is not now possible.

THE COMPARATIVE STUDY OF DIFFERENT TYPES OF VENTILATING SYSTEMS.

At the Whitney School in Minneapolis observations have been taken during the winter on five types of systems of ventilation. A committee from the laboratory at an early date will go to Minneapolis to make a survey, and if possible a report, on the particular points of merit of each system at the June meeting of the society.

The foregoing is a presentation of the research problems that are being conducted at the present time. Many other lines of investigations have been planned, but the personnel of the laboratory and the facilities do not make it possible to push more investigations at the present time. The laboratory is rapidly becoming a clearing house of information on subjects affecting the practical side of heating and ventilating engineering.

It is the purpose of the laboratory

officials to stimulate the establishment of codes for testing commercial apparatus. The first step in this direction is a recent code formed by the National Association of Fan Manufacturers and the American Society of Heating and Ventilating Engineers for the testing of centrifugal and propeller fans. Reports and papers will be presented on most of the problems mentioned above at the June (Buffalo-Detroit) meeting of the American Society of Heating and Ventilating Engineers.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Annual Meeting of Michigan Chapter.

Members of the Michigan Chapter proved that you can "kill two birds with one stone" by meeting at the Bloomfield Hills Country Club, May 15, and planning for the mid-summer meeting of the American Society of Heating and Ventilating Engineers, at the same time holding their annual meeting and election of officers. The affair commenced with golf in the afternoon, followed by an informal dinner at the clubhouse. After dinner, the chapter elected its officers for the coming year and then the meeting proceeded to organize the ladies committees' for the summer meeting of the society. This was successfully accomplished to the accompaniment of dancing and a general good time,.

Illinois Chapter Closes Season.

Generous praise for the work of the Illinois Chapter in exceeding its quota of $3,000 for the support of the society's Research Laboratory was given by President J. R. McColl, who was one of the principal speakers at the chapter's concluding meeting of the season, at the Engineers' Club, Chicago, May 8. Other speakers were F. R. Still, former chairman of the Research Committee, who declared that due to the research work done at the laboratory we have come closer to knowing what good ventilation is and what it means than in 400 years previous to that time; and Director F. Paul Anderson, director of the Research Laboratory, who gave an interesting talk, illustrated by charts, detailing the work under way at the laboratory. Former President Harry M. Hart was the chairman for the evening.

New York Chapter Entertained at Plant of Carrier Engineering Corporation.

In response to the invitation of the new president of the New York Chapter, Willis H. Carrier, the concluding meeting of the chapter for the season was held May 22 at the plant of the Carrier Engineering Corporation, in Newark. Rumors that some novelties, both of a technical and social nature, would be presented at the meeting served to swell the attendance to fully 300 members and guests, including a delegation from the New York Section of the American Society of Refrigerating Engineers. Special buses met the arrivals at the tube station in Newark and carried them directly to the plant. Here the guests were ushered into the reception room where evidence was furnished that the company takes its own medicine, the balmy air currents being easily traced to the air conditioning system with which the plant is equipped. All of the dinner arrangements were in the hands of the company's organization, including the principal members of the orchestra and the young waitresses who looked very pretty in their white costumes and who served with skill and deftness.

At the conclusion of the dinner, President Armagnac called upon J. I. Lyle, treasurer and general manager of the company, who welcomed the guests to the plant. The company's research engineer, A. E. Stacey, Jr., then gave the guests a demonstration of the Carrier ejector processing experimental cabinet which has recently been brought out. The outfit was held in the air at the end of a chain pulley and the diners were able to get a clear idea of its construction and operation without leaving their seats.

President Armagnac then presented Mr. Carrier as a man whose name was one that would long be conjured with in the heating and ventilating industry. Mr. Carrier gratified much curiosity by explaining the construction of a new apparatus which the company has been developing and which is now ready to be placed on the market. It turned out to be a refrigerating machine in which the refrigerant used is a liquid which, he said, had a heat transmission property far in excess of anything used heretofore in commercial work. Whereas the customary transmission is about 60 B. T. U. per square foot per degree difference with Baudelot coils, using ammonia, the new refrigerant, he

MEMBERS AND GUESTS OF NEW YORK CHAPTER, A. S. H. & V. E., AT PLANT OF CARRIER ENGINEERING CORPORATION.

said, will run from 400 to 600 B. T. U. Also there is no depreciation of water cooling coils or condensers. Due to heat transmission characteristics a 50-ton machine, with four stages, may be made equal in size to an ammonia machine of 500 H. P., with 16 stages, or an ethyl-chloride machine of 100 H. P. Mr. Carrier said that the new refrigerant cools through surface evaporation. No metal, brass or copper is necessary in its construction.

EXHIBIT OF NEW REFRIGERATING MACHINE AT PLANT OF CARRIER ENGINEERING CORPORATION.

At the conclusion of his talk the members and guests were given an opportunity to inspect one of the new machines, a 20-ton unit, with four stages, which was in operation at the plant. This also gave the guests a chance to see the plant itself.

On returning to the assembly room the guests found a boxing arena roped off in preparation for two boxing bouts between Newark boxers. These brought the evening to a close although before the guests departed they responded enthusiastically to a call for a rising vote of thanks for the company's hospitality.

Organization of American Construction Council.

An organization which has among its purposes, the development of a code of ethics for the construction industry, the development of a national building code, a reasearch and statistical bureau, the lengthening of the construction season, the elimination of waste, the simplifying of standards and dimensions of building materials, the development of apprenticeship systems and encouragement of local study and better understanding of building situations, has just been formed in Washington. Herbert Hoover acted as chairman at the organization meeting and the first president is Franklin D. Roosevelt, formerly Assistant Secretary of the Navy.

All branches of the industry are represented in the new body, and they have been divided into the following groups, each with equal voting power:

Architects, engineers, general contractors, sub-contractors, construction labor, material and equipment manufacturers, material and equipment dealers, financial, bond and real estate interests, public utility construction departments, and the construction divisions of federal, State and municipal governments.

So far as is known, this is the first time in the history of American industrial development that any industry has been represented by an organization in which all the elements have been brought together for the mutual interest of the industry and the public.

Plans for Annual Convention of Smoke Prevention Association.

Cleveland, Ohio, has been selected as the meeting place of the Smoke Prevention Association, which will hold its sixteenth annual convention there, June 13-16. This association is devoted to the elimination of smoke, on account of its detrimental effect upon health, and its accompanying waste of fuel and damage to property. The association is composed of the smoke inspectors of the large cities, representatives of railroad companies and manufacturers of fuel-burning equipment.

Among those who will address the convention are C. W. Colby, of Colby-Merrill Co., Cleveland; Mrs. Howard A. Turner, chairman, Smoke Abatement Committee, Woman's Club, Minneapolis, Minn.; Gordon D. Rowe, chief smoke inspector of Cincinnati, O., and Henry Turner Bailey, dean of the Art School Cleveland.

The secretary of the association is Frank A. Chambers, chief smoke inspector of Chicago, with headquarters in the City Hall Square Building, Chicago.

British Heating Engineers Broadening Their Field.

In an effort to broaden the interests of the profession, President A. H. Barker, the new president of the (British) Institution of Heating and Ventilating Engineers announces that among the speakers who will address forthcoming meetings of the institution is Professor Bayliss, who is characterized as one of the most eminent physiologists in the world. His subject will be: "The Thermostatic and Other Self-Regulating Devices in the Human Body." In writing of Professor Bayliss, Mr. Barker states that the discovery of hormones, or "chemical messengers" in the blood, is almost entirely due to him.

Other papers in course of preparation are the following: "The Law of Contracts as it Affects the Heating Engineer," by Mr. Colam, the Recordor of Croydon; "The Theory of Heat Transmission Through Non-Conducting Compositions," by Mr. Kinoshita; and "The Electrical Driving of Fans and Pumps," by Professor Clinton.

The summer meeting of the institution will be held in Oxford.

Current Heating and Ventilating Literature.

POSSIBILITIES OF GASEOUS HEATING, H. H. Clark. Western Soc. Engrs. Jl., vol. 27, no. 2, Feb. 1922, pp. 51-56 and (discussion) 56-58, 5 figs. Relative combustion efficiency of the various gases assuming perfect combustion; comparison of costs of various fuels; comparison of gas and electricity for heating, power and light. Gives a number of charts.

EFFECT OF CO IN AIR. The Physiological Principles Governing Ventilation. When the Air is Contaminated with Carbon Monoxide, Yandell Henderson and Howard W. Haggard. Jl. Indus. & Eng. Chem., vol. 14, no. 3, Mar. 1922, pp. 229-236, 5 figs. (Abstract.) Report to Chief Engineer of New York & New Jersey Tunnel Commissions.

Needed Legislation Regarding Heating Work.

In a report presented before the Ontario Society of Domestic Sanitary and Heating Engineers, W. J. Clifton, chairman of the society's Heating Committee, proposed legislation on a number of points connected with heating practice. His specific recommendations were:

1. Have chimneys the proper size and height.
2. Have all heating systems of sufficient size to heat the buildings.
3. Have all persons installing heating systems qualified.
4. Have all heating installations inspected.

CLEVELAND'S AMERICAN BUILDING EXPOSITION

Crowds that taxed the capacity of the Cleveland New Municipal Auditorium eloquently attested the interest felt in the "American Building Exposition" which was held in the auditorium during the week of April 23—May 2. In spite of the delays which threatened at one time seriously to interfere with the holding of the exposition, the interest was in no way abated and those who attended were well rewarded in the character and extent of the exhibits. Many came, of course, to see the building itself with its 72,000 sq. ft. of floor surface built at a cost of $6,600,000.

One of the most striking features that met the eye on entering the building was the scheme of lighting. Sixty feet above the main floor, the ceiling curves downward on each side towards the balconies. Through the arrangement of the lighting fixtures, it had the appearance of a vast skylight through which the sun seemed to shine. As a matter of fact, however, powerful lights above the glass ceiling produced this effect and by lowering the lights, the soft effects of dusk and moonshine were obtained.

The exhibits themselves were in many cases remarkable for their completeness. Full-sized houses, for instance, were displayed by the Cleveland Builders Supply and Brick Company.

New Publications.

THE IGNITION TEMPERATURE OF COAL, by R. W. Arms, published as Bulletin No. 128 by the Engineering Experiment Station of the University of Illinois, makes a study of this problem with the object of determining the influence of the temperature of ignition of the various coals upon the liability to fire while in storage. In this bulletin is given a discussion of what point may actually be designated as the ignition temperature and what factors influence that point, the methods for determining the ignition temperature of different coals, and the results of tests upon the various coals used in this investigation.

Copies of the bulletin may be had without charge by addressing the Engineering Experiment Station, Urbana, Ill.

PROCEEDINGS OF THE FOURTEENTH ANNUAL MEETING OF THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, held in Baltimore, December 6-9, 1921, have been published as Bulletin No. 24, by the institute. The proceedings as published in this bulletin, are confined to the discussions, the reports and papers themselves being printed separately. One of the best things in the bulletin is the reply made by B. B. Morey to the proposal that the name of the institute should be changed from "American Institute of Chemical Engineers" to "Institute of Chemical Engineers," "Mr. President," he said, "take from our title the words 'Institute of,' and we shall still be known as American Chemical Engineers. Cut out the word 'Chemical,' if you must, and we shall still be found as American Engineers. Cut off the word 'Engineers,' if you must, and we still will be known as Americans." The vote was unanimous for retaining the present name. Special mention was

TYPICAL EXHIBITS AT THE CLEVELAND "AMERICAN BUILDING EXPOSITION."

made in the bulletin of the report of the institute's Committee on Chemical Engineering Education, presented by Dr. Arthur W. Little, and which was considered so important that a special reprint was ordered. As one speaker expressed it, "it strikes me that this is the most complete and most admirable report on chemical engineering education ever written, and there is the greatest possible opportunity for the American Institute of Chemical Engineers to make a worthy contribution to the education of this group of men in this country."

THE TANNIC ACID METHOD FOR THE QUANTITATIVE DETERMINATION OF CARBON MONOXIDE IN THE BLOOD is described in one of the Reports of Investigations of the Bureau of Mines, issued as serial No. 2356 and dated May, 1922. It is written by R. R. Sayers, chief surgeon of the Bureau of Mines; and W. P. Yant, assistant chemist of the Bureau of Mines. The procedure is described and a comparison drawn between the tannic acid method and the spectrophotometric, carmine and Van Slyke methods for the determination of CO in blood. The authors express their belief that the method described is particularly adapted to the requirements for the determination of poisoning by CO gas.

HOW TO BUILD A BETTER HOME is the title of a book on building issued for free distribution by the Copper and Brass Research Association, 25 Broadway, New York. The book is attractively illustrated and contains information of value to the prospective home builder. A chapter is devoted to heating, one to plumbing, one to hardware fixtures and another to decorations. Still another chapter is devoted to the roofing problem. Illustrations show different types and the proper manner to apply the material. The contention is made that the everlasting metals —copper, brass and bronze—would be universally used if it were not for their slightly higher cost. The association maintains a building service department, which answers, free, inquiries on brass pipe and pipe fittings in plumbing; copper in roofs, leaders, gutters, etc.; copper, brass or bronze in building hardware and fixtures. Size 8 x 10¾ in. Pp. 30.

NATIONAL DISTRICT HEATING ASSOCIATION

Program for Annual Meeting.

Plans are practically completed for the forthcoming thirtieth annual convention of the National District Heating Association which will be held in Cedar Point, O., June 20-23, at the Breakers Hotel. Subject to some minor changes, the program is as follows:

AFTERNOON SESSION, JUNE 20.

President's address
Report of secretary-treasurer
Report of Educational Committee, J. C. Hobbs, Pittsburgh, Pa., Chairman
Report of Accounting Committee, A. D. Spencer, Detroit, Mich., Chairman
Appointment of Nominating Committee
Appoint of Convention Committees

MORNING SESSION, JUNE 21.

Report of Heating Research Committee, H. T. Luscomb, Chairman, New York City

Paper—Methods and Value of Plant Interconnection, J. C. Butler, Illinois Maintenance Company,, Chicago, Ill.

Report of Heat Utilization Committee, C. H. Day, Chairman, Cleveland.
Report of Nominating Committee.

AFTERNOON SESSION, JUNE 21.

Report of Station Operating Committee, R. D. DeWolf, Chairman, Rochester, N. Y.

Paper—Fusibility of Ash, Mr. Feildner, Bureau of Mines, Pittsburgh, Pa.

Report of Operating Statistics Committee, E. S. Shultz, Chairman, Chicago, Ill.

MORNING SESSION, JUNE 22.

Report of Meters and Accessories Committee, J. C. Butler, Chairman, Chicago, Ill.

Address F. Paul Anderson, Director of Research, American Society of Heating and Ventilating Engineers, Pittsburgh, Pa.

Paper, James A. Donnelly, New York City.

AFTERNOON SESSION, JUNE 22.

Report of Underground Construction Committee, N. W. Calvert, Chairman, Detroit, Mich.

Report of Rates Committee, L. E. Young, Chairman, St. Louis, Mo.

Report of Public Policy Committee, D. S. Boyden, Chairman, Boston, Mass.

Report of Rules and Regulations Committee, E. L. Wilder, Chairman, Rochester, N. Y.

Election of officers

MORNING SESSION, JUNE 23.

Round table on new appliances and new methods

Paper—Central Station Service in Government Work

Barnes & Jones To Manufacture a New Line of Vapor and Vacuum Heating Appliances.

Barnes & Jones, 12 Pearl Street, Boston, Mass., until recently representing the Thermograde Valve Company in the sale of its products, announce that they are now manufacturing and selling a complete line of their own design of all appliances necessary for the successful operation of vapor and vacuum systems of heating. These appliances will be marketed under the trade name of Barnes & Jones and will include modulation valves, thermostatic return and drip valves, the Barnes & Jones condensator for returning the water of condensation to the boiler under varying pressure conditions, and such auxiliary apparatus as is required.

Both Walter E. Barnes and William T. Jones, who compose the firm, are former Thermograde valve men. Mr. Barnes was president and treasurer of the Thermograde Valve Company, and since its formation, in February, 1902, its active manager. Mr. Jones was connected with the Thermograde Valve Company in the engineering and sales departments since 1912. During the latter part of this period he was the New England sales representative in which position he acquired an extensive engineering knowledge of present day methods of heating.

The experience of both men, acquired during many years of service, it is added, is embodied in the apparatus they are now marketing commercially. In addition the firm announces that it stands ready to render a service and co-operation with each installation which have always been characteristic of their business policy.

Death of John S. Hoy.

A man well known to the older generation in the heating and plumbing trades and who, until recently, was still active in the industry, passed on when John S. Hoy, head of the supply house of Hoy & Co., Albany, N. Y., died at his home in that city, April 17, of pneumonia. He was 58 years old. The firm of which he was the head was founded by his father over 75 years ago. It had grown to be one of the largest heating and plumbing supply houses in the State. The celebration of the firm's 75th anniversary took place April 1, on which occasion Mr. Hoy was the recipient of many congratulatory messages. Although pneumonia was the immediate cause of death, he had been a sufferer for some time from diabetes.

Mr. Hoy was prominent in both business and social life in Albany, being a director of the Albany Trust Company, and a member of the Fort Orange Club, Albany Country Club and of Kappa Alpha fraternity. He was a man of unusual personality which won him the respect and love of a wide circle of friends.

NATIONAL TRADE EXTENSION BUREAU

SELLING HEATING EQUIPMENT ON THE INSTALLMENT PLAN

A time payment plan for use in connection with the selling of heating and plumbing equipment has been developed by the National Trade Extension Bureau and is described in the bureau's Monthly Service Bulletin for April. For the past eighteen months, the bureau has been experimenting and collecting data relative to time payment sales. During the last nine months, the bureau has had four firms in four different sections of the country, carry on these installments. During the past year, the bureau has consulted with bankers of different types and kinds, and has finally been advised that the plan in its present form is practical, acceptable to bankers, and workable in practically every section of the country.

The first step in handling business of this character, it is pointed out, is a proper contract. This condition has been met by the bureau in the bid and contract forms which have been prepared and which can be secured from the bureau at prices ranging from 50 cents to $1.25 per pad of 50 sets, in duplicate. The following clause has been found to be essential in practice of this character and is embodied in T. E. B. contract forms:

"It is hereby expressly provided that the title to the above-described materials to be so furnished by the undersigned shall be and remain in the undersigned until all sums of money called for in this proposal and required to be paid by you are fully paid the undersigned in legal tender of the United States; and that, until said sums of money are so paid, said materials shall be and by your acceptance hereof you agree that they shall be and remain personal and movable property, in whatsoever manner they may be annexed to realty; and that, in case of default in the payment of any of the installments above provided for, the undersigned is hereby authorized to enter upon said premises and take possession of and remove said materials at any time; and that, in such event, the undersigned shall have the right to retain as rental for the use of said materials any sum or sums of money that may have been paid by you; and that all expenses incurred by the undersigned by litigation arising out of, and caused by failure to make the payments as herein provided for, shall be paid by you."

HOW TO FIGURE ON THE JOB.

The job should be figured in the usual way. For example, assume that the material on a bathroom heating job, or any other kind of an installation, amounts to $300 (cost), and the labor $100, making a total of $400. Assume that the overhead is 25% on sales and 10% profit on sales is desired. Therefore, add the overhead and the profit together, which amounts to 35%; and by subtracting this from 100%, there is a remainder of 65%, which represents the cost. Therefore, divide the $400 cost by 0.65 and the selling price is found to be $615.38.

This establishes the selling price. The next step is to find the amount the owner should pay down in cash. The average banker, it has been found, looks more favorably upon a loan of this kind if the first payment will cover at least the cost of labor. In most cases this amounts to from 10% to 20% of the selling price, but in this case it amounts to $100.

Therefore, the customer should pay $100 in cash when the contract is signed; and deducting $100 from $615 leaves a balance of $515. The next step is to add proper interest to the selling price, before submitting the bid.

For example, assume that this is not an old firm, and that the credit at the bank is rather weak. Also assume that the commercial rate of interest charged by the bank is 7%.

In order to make the business sufficiently attractive to the bank to act as financier and collection department, it will be agreed upon to pay 8% on all time payment loans instead of 7%. Therefore, multiply the $515 balance by 8%, which amounts to $41.20. This interest, plus $615, the selling price, equals $656.20, which is the amount that will be written in the bid and contract as the contract price.

It will be noted that interest has been figured on the $515.00 for a full year; while the interest, in reality, will only amount to about half of the $41.20; due to the fact that the customer is paying off $50 each month. The full interest is figured to take care of comebacks or defects that may occur to the work during the year. The extra $20 will make it possible to give the customer every attention; and is a guarantee to the bank that all customers will be taken care of, and will have no excuse for failure to pay.

Granting that $100 is to be paid down in cash and, the balance in monthly installments of $50 each, subtract $100 from $656.20, which leaves $556.20; and this divided by 50, makes eleven monthly installments of $50 and one for $6.20.

A provision is then inserted in the contract that the owner is to pay $100 cash at the time of signing the contract or at the time the work is started; and that the balance is to be paid at the bank on twelve labor and material acceptances, eleven of which are to be made out for $50 each and one for $6.20, one acceptance falling due each successive month. These acceptances must be made out and signed by the purchaser when the contract is signed.

The labor and material acceptances should be like the T. E. B. form B-12 (reproduced herewith). These can be secured from the bureau at $1.00 per pad of 100, and should be made out as shown in Fig. 1.

The labor and material acceptance is used in preference to a note, for it is better commercial paper, and does not close an account as does a note. If a note is used, the dealer would have to sue on the note in case of default on any of the installments.

When a labor and material acceptance is used in connection with T. E. B. contract forms, as mentioned the dealer can remove all materials, hold as rental any payments that have been made, and use the acceptance as proof of his right to collect any losses that he may have suffered.

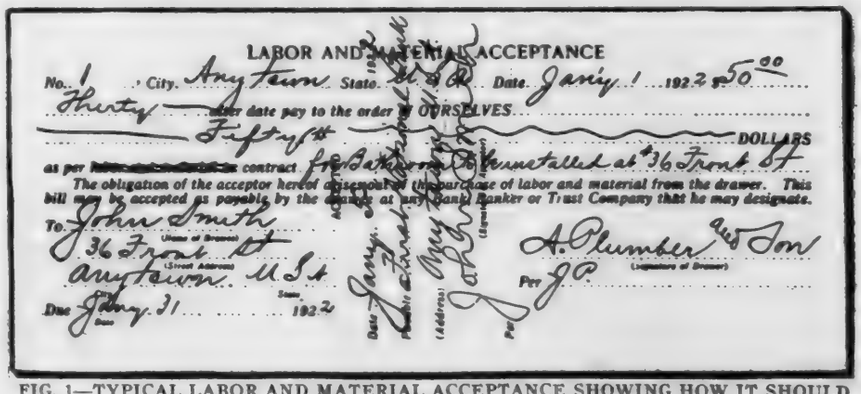
HOW TO HANDLE LONG TIME PAYMENTS AT BANK.

The banker will take the position that long time loans are not sought by national or State banks, but are acceptable by trust and savings banks. This is particularly true now, while we are going through a rather tight money market. If the bank is a national or state institution, it is suggested that the long time payments be handled as follows:

Discount the first four labor and material acceptances and pay the interest on them. In the case cited above, it would still leave $356.20 in acceptances.

Then, the contractor should give the bank his note for $356.20 for four months, and secure the note by putting up the balance of the trade acceptances as collateral. Also, contract signed by the owner should be attached if the bank requests such action as would be likely in the event that the contractor's credit is limited.

In this manner cash is secured for the entire job and this permits of the discounting of bills. The profit has been


LABOR AND MATERIAL ACCEPTANCE

No. 1 City. Anytown State. N. Y. Date. Janiy 1 1922 $ 50 00

Thirty — after date pay to the order of OURSELVES

Fifty ⁰⁰ DOLLARS

as per contract for Bathroom Heating Outfit installed at 36 Front St

The obligation of the acceptor hereof is exclusively for the purchase of labor and material from the drawer. This bill may be accepted as payable by the drawer at any Bank Banker or Trust Company that he may designate.

To John Smith

36 Front St

Anytown N Y

Due Jany. 31 1922

A. Plumber & Son

Per J P

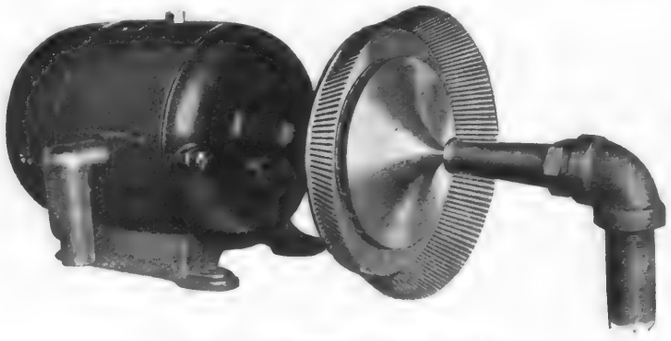
FIG. 1—TYPICAL LABOR AND MATERIAL ACCEPTANCE SHOWING HOW IT SHOULD BE FILLED OUT

secured from the job and there is $20 to take care of all comebacks. Not the least advantage of this selling plan is the fact that the banker can be used as a credit bureau.

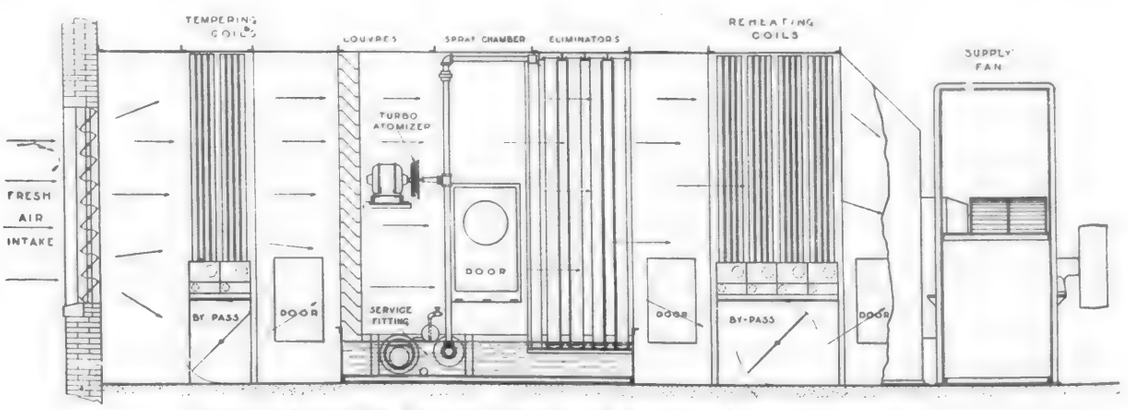
When the labor and material acceptances and the supporting contract are signed—before any of the work is done—the bankers should be asked if they'll discount the acceptances. If the owner's credit is risky, the banker will probably know it—or find it out—and this will afford protection against doing work for a man who can't or won't pay.

New Apparatus and Appliances

BAYLEY TURBO AIR WASHER AND AIR CONDITIONER, for cleaning, cooling, tempering, humidifying and dehumidifying air, is a unique device which has been brought out by the Bayley Manufacturing Co., Milwaukee, Wis., and is described in one of the company's latest bulletins (No. 23). The principal feature of the washer is the turbo atomizer which was designed by E. M. Bassler, vice-president and chief engineer of the company. This atomizer, it is stated, will atomize 38 gal. of water per minute per horsepower, and the point is made that it is easily adapted to existing air washing systems. The entire outfit consists of an electric motor with waterproof frame, the cone-shaped atomizing rotor and the water-delivering nozzle. The motor is of the fully enclosed navy type while the atomizing rotor is of bronze, the atomizing pins being of hard brass pressed into the cone and sweated. This rotor is mounted directly on the motor shaft. The water-delivering nozzle is of the fire-nozzle type made of bronze and machined to the required taper to deliver water at high velocity with a minimum of pressure. The fact that it has no passageways smaller than 5/8 in. in diameter is presented as evidence that it is not easy to become clogged. The turbo air washer and air conditioner is made regularly with capacities from 4500 to 110,000 cu. ft. As it operates at a low water pressure, the saving in power required for operation is given as from 40% to 60%. Full details are given in the catalogue, including views of the casing. These are supplemented by data tables for the two types in which the outfit is furnished. There are also a number of typical installation views bringing out the range of its application. These views will be found very useful in guiding those making their initial installations of this apparatus. The catalogue concludes with a typical specification form for Bayley turbo air washers. Size 7¾ in. by 10½ in. Pp. 32.



BAYLEY TURBO AIR WASHER.

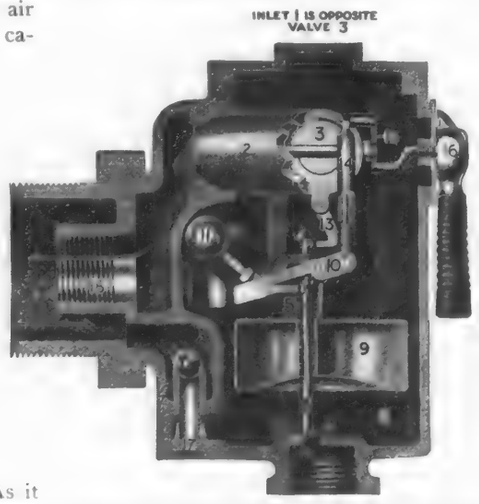


INSTALLATION OF BAYLEY TURBO AIR WASHER AND CONDITIONER.

A Dual Radiator Valve.

A device in the form of a radiator valve, which serves as both the supply and return connection to a radiator, has been brought out by the Heating & Power Appliance Co., of Milwaukee, Wis., under the name of the Dual valve. It is designed to eliminate trap troubles so often found in connection with vacuum, vapor and atmospheric systems of heating. The valve is of such construction that high pressure and vacuum can be maintained simultaneously.

The unique feature of the appliance is that the supply valve and trap features are incorporated in one body or casting. Two discharge valves are provided in connection with the Dual valve and precautions have been taken to prevent steam from making its exit to the return line. This particular feature is emphasized by the manufacturers as serving to eliminate one of the most common causes of trap troubles



DUAL VALVE WHICH SERVES AS BOTH SUPPLY AND RETURN CONNECTION TO RADIATOR.

The high-pressure type of Dual valve resembles in construction the low pressure valve. It has, however, additional features whereby the supply or inlet valve is automatically closed during the time that condensate is being discharged. The operation in both types of valves is controlled by the con-

densation in the chamber provided for that purpose. Consequently the operation is not affected by pressures or temperatures.

The Dual valve, it is stated, is the result of much practical experimentation on the part of the engineers of the Heating & Power Appliance Company. The fact that it has been endorsed by them and put out by the company is mentioned as convincing evidence of its value and usefulness.

The Autovent Window Ventilator.

A new window ventilator designed for use in residence kitchens, homes and offices, and which can be installed by anyone without installation expense, has been brought out by the Autovent Fan and Blower Company, Chicago, Ill. It is described as adjustable to any size window and can be installed in two minutes' time in the window sash. The ventilator is connected to the light-

TYPICAL INSTALLATION OF AUTOVENT WINDOW VENTILATOR.

ing circuit and its cost of operation, it is stated, is less than 1 cent per hour. One of the interesting features of the ventilator is that when not in operation, the window can be closed and locked.

This device is equipped with a regular constant-power motor especially designed and constructed for continuous duty. The motor is of the well-known Autovent protected type to prevent breakdowns and burnouts.

This ventilator is made in three standard direct-current and three standard alternating-current sizes. The design is so arranged as to give flexible adjustment varying from 1/64 in. up to and including a maximum of 6 in. over all. The minimum sizes of the board, when not adjusted, are 25 in., 31⅛ in. and 37⅛ in. The main board and extension are of sheet metal, with angle frames and borders.

The fan motor is of the regular 12-in. size applicable only to 110-volt circuit at a speed of 1700 R. P. M., and handles 850 cu. ft. of air per minute. Special emphasis is laid by the manufacturer on the ability of this ventilator to exhaust cooking odors, excessive heat, smoke, steam and stagnant air particles.

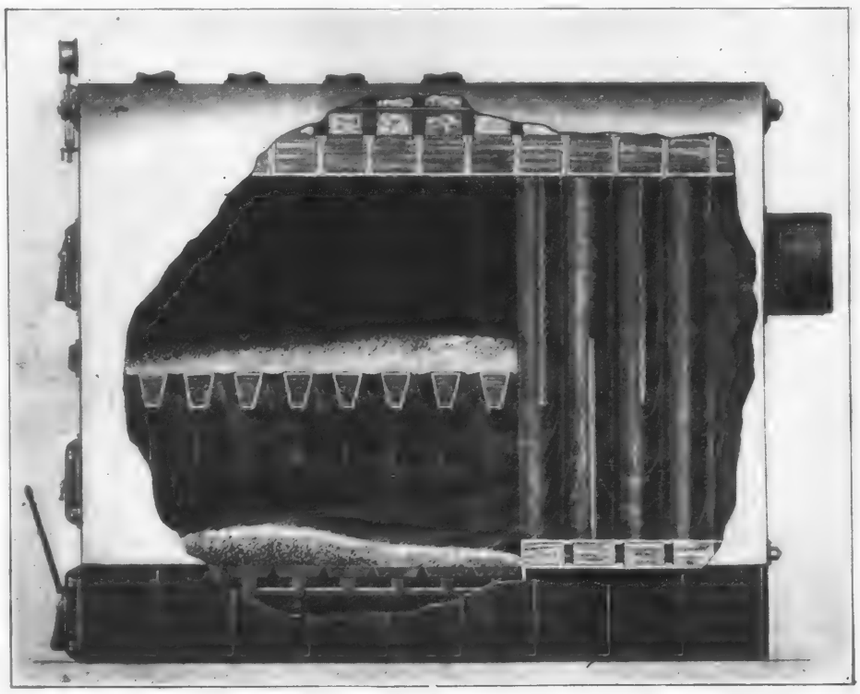
Trade Literature.

UNIVERSAL SELF-CLEANING BOILER, described as the only self-cleaning boiler and designed for both down and updraft, is an interesting type which has been brought out by the Universal Smokeless Boiler Co., Wheeling, W. Va., and is described in a recent catalogue. The construction is sectional and comprises four standard sections, front, back, firebox and water-tube, from which a boiler of any desired grate area or heating surface can be constructed. All surfaces are vertical, giving the boiler its self-cleaning feature, as no accumulation of the products of combustion can accumulate on these vertical water tubes. This, of course, has an important effect in maintaining full efficiency. The system of integral baffles cast on the vertical tubes is designed to insure still further the boiler's efficiency, due to the convection of the hot gases over the entire length of each tube. While this boiler is of the down-draft water-tube type, it can also be fired as an updraft boiler by reversing the relative position of the baffled water-tube sections. It is furnished in sizes ranging from 3100 sq. ft. to 9,100 sq. ft. direct steam radiation. Size 8½ by 11 in. Pp. 4.

MONASH THERMOSTATIC RETURN LINE TRAPS are described in a new general catalogue being issued by the Monash-Younker Company, Chicago, Ill. The distinctive feature of these traps is the diaphragm which is a separate and independent unit held in place in such a way as to eliminate the possibility of fracture or rupture. Among the types shown are the Monash No. 35 return line traps, and the Monash Nos. 40, 42 and 44 thermostatic return line traps for dirty systems. Additional products of the company are Monash packless graduated supply valves, Monash quick-venting valves for use at high points where a large volume of air must be rapidly vented; and four-way drain lock-shield automatic air valves and non-adjustable automatic air valves with removable syphon drain and metal thermostat.

SANITARY TIMES for April 15, 1922, the periodical of the Ever Hot Heater Co., Detroit, Mich., maintains its reputation, established with its first number, for breeziness and news items of current interest. Among the illustrations is a photograph of the EverHot heater exhibit at the Detroit Builders' Show. In connection with this exhibit a guessing contest was held as to the number of cubic feet of gas consumed by the pilot light of the EverHot Junior water heater, which was included in the exhibit. The pilot light burned steadily for 168 hours. The successful guess was 178¼ cu. ft., made by A. B. Hansen of Detroit. The actual figure was 178½ cu. ft.

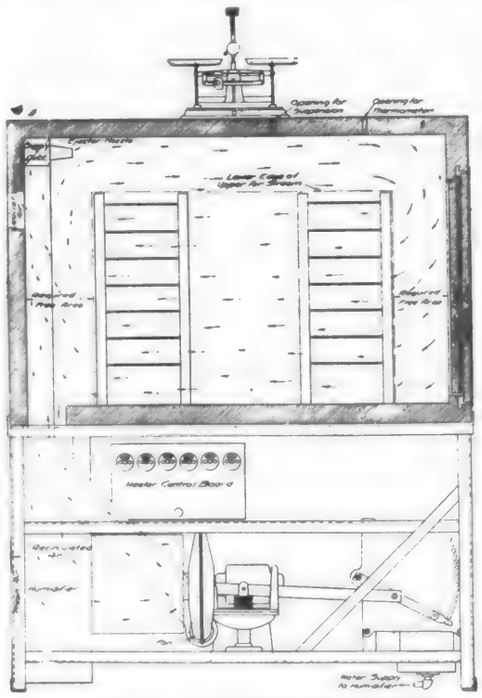
THE VALVE WORLD for May, 1922, the monthly periodical of Crane Company, Chicago, Ill., contains among other things, an interesting description, with illustrations, of a new plant of the Mutual Potteries Company in Trenton, by the editor, Justin W. McEachren. There is also an editorial summary of the present status of the metric campaign.



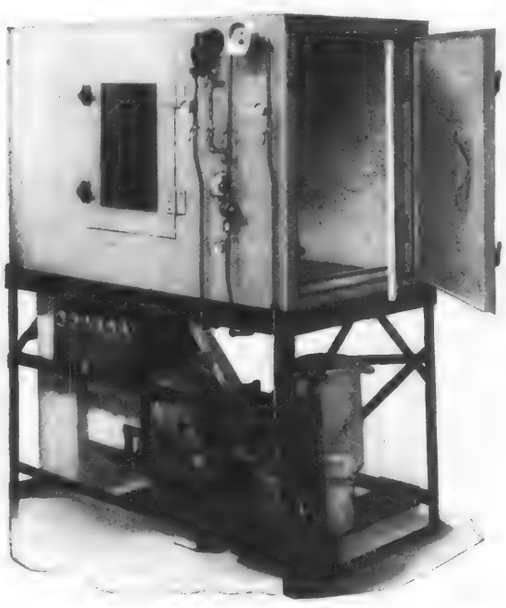
CONSTRUCTION OF UNIVERSAL SELF-CLEANING BOILER.

WEATHER VEIN for May, 1922, the monthly periodical of the Carrier Engineering Corporation, Newark, N. J., has an interesting article on the subject of research laboratories, supplemented with illustrations of the laboratories at the works of the General Electric Company, in Schenectady, and at the Experiment Station of the Bureau of Mines in Pittsburgh, conducted in the interests of the American Society of Heating and Ventilating Engineers. Under the title of "The Carrier Ejector Processing Cabinet," an illustrated description is presented of a model cabinet which has been designed by the company to permit tests and experiments to be made on a small scale. The cabinet is self-contained and the various conditions of temperature, humidity and air circulation are under accurate automatic control. These new units have been found especially useful to manufacturers desiring to make experiments of their own. Air circulation within the cabinet is accomplished by means of the Carrier ejector system. The air from the fan is blown into the chamber through a series of converging nozzles, emerging at a relatively high velocity. These nozzles are located across the end of the cabinet near the ceiling. The high velocity jets of air issuing from the nozzles set up, by their ejector effect, a secondary circulation within the chamber, of about four times the volume of air actually delivered through the nozzles. Thus the entire volume of air within the chamber is kept in constant motion, following a circuit beginning with its comparatively rapid movement across the top of the chamber and completed by its slower, uniform movement in the opposite direction across the remaining area of the chamber. The fan delivers about 100 cu. ft. of air per minute through the nozzles, and the ejector effect draws into circulation about 300 cu. ft. additional per minute.

Control of the relative volumes of fresh and return air is effected, at the will of the operator, by manipulation of the damper lever at the end of the cabinet. The fresh and return air are mixed in the humidifier. Humidification is accomplished by means of an atomizing spray nozzle, operated by compressed air. The humidifier will saturate up to 120° F., corresponding to an absolute humidity of 34.8 grains of vapor per cubic foot of air. This, it is stated, is more than ample for practically all purposes. Electric heaters are used, arranged in individually-connected units. The complete unit is listed \$15.00.



COURSE OF AIR THROUGH CARRIER EJECTOR PROCESSING CABINET.



CARRIER EJECTOR PROCESSING CABINET WITH AIR DAMPERS FULLY OPENED.

CARRIER EJECTOR PROCESSING CABINET WITH AIR DAMPERS FULLY CLOSED.

The Konrad Meier Heating and Ventilating Charts.

Recent orders for separte copies of the chart accompanying Konrad Meier's "Mechanics of Heating and Ventilation," call renewed attention to these charts which are gotten up in an unusually durable and usable manner. The charts are printed on cloth, with lines of different colors and are mounted on card board. They cover the flow of water, steam and air under various conditions and give at a glance the results of a calculation from any combination of factors.

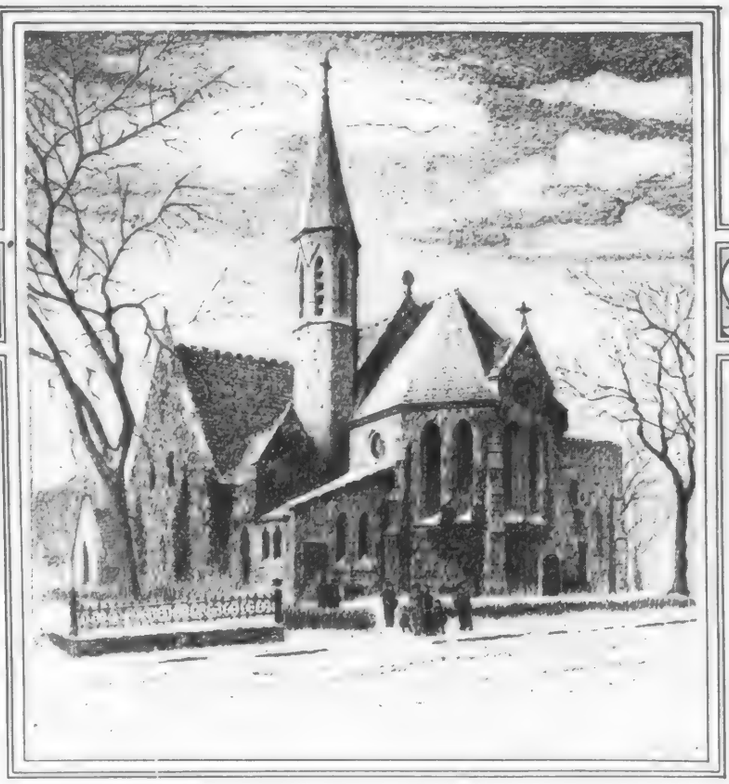
The complete set consists of the following ten chars:

Chart No. 1. Forced water heating.
Chart No. 2. Gravity water heating, 200° to 160°.
Chart No. 3. Gravity water heating, 190° to 155°.
Chart No. 4. Gravity water heating, 180° to 150°.
Chart No. 5. High-pressure steam, 70 lbs.
Chart No. 6. Low-pressure steam, 5 lbs.
Chart No. 7. Low-pressure steam, 1 lb.
Chart No. 8. Air blast at high velocity.
Chart No.9. Forced ventilation.
Chart No. 10. Warm-air heating and ventilation by gravity.

The price per chart is \$1.50, and the price for the complete set of ten charts, with a general description of them, is \$15.00.

These charts may be had from the book department of THE HEATING AND VENTILATING MAGAZINE.

An organization meeting of the American Construction Council will be held in Washington, D. C., June 19-20.



From a drawing by Wesley Bonestell © ARCO 1922 Architects: Henry M. Congdon & Son, New York

TRINITY CHURCH, Waterbury, Connecticut, where two IDEAL TYPE A HEAT MACHINES are paying for themselves in the fuel they save.

How much less in the end!

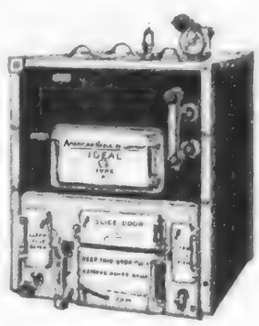
THE old-fashioned heating plant in this church burned 80 tons of coal in the winter of 1918-19.

The church committee hesitated whether to substitute IDEAL TYPE A HEAT MACHINES, or a cheaper boiler. They decided to pay a little more for the IDEAL TYPE A.

The following winter, a hard winter, 65 tons were burned.

Last winter, a mild winter, 55 tons were burned.

A saving of 40 tons in two years!



There are two kinds of heating equipment—the kind that is merely a purchase; and the kind that is a long-time investment.

The American Radiator Company is in the business of selling heating investments. Sometimes they cost a trifle more in the beginning—but how much less in the end!

TO ARCHITECTS OR ENGINEERS who have residences or buildings under way this Summer: Your name on your letterhead, sent to either address below, will bring a finely illustrated book of the IDEAL TYPE A HEAT MACHINE showing heat test charts and details of construction.

AMERICAN RADIATOR COMPANY

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THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

RADIATION COMPUTING

Heating-Steam-

12" Brick Wall Lath, furring and plaster on inside.

Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.
20	2	2	2	2	900	86	108	99	90
40	4	5	4	4	920	87	111	101	92
60	6	7	7	6	940	89	113	103	94
80	8	10	9	8	960	91	115	105	96
100	10	12	11	10	980	93	117	108	98
120	11	14	13	12	1000	95	120	110	100
140	13	17	15	14	1020	97	123	112	102
160	15	19	18	16	1040	99	125	114	104
180	17	22	20	18	1060	101	127	116	106
200	19	24	22	20	1080	103	129	119	108
220	21	26	24	22	1000	105	132	121	110
240	23	29	26	24	1120	106	135	123	112
260	25	31	29	26	1140	108	137	125	114
280	27	34	31	28	1160	110	139	127	116
300	29	36	33	30	1180	112	141	131	118
320	30	38	35	32	1200	114	144	132	120
340	32	41	37	34	1220	116	147	134	122
360	34	43	40	36	1240	118	149	136	124
380	36	46	42	38	1260	120	151	138	126
400	38	48	44	40	1280	122	152	140	128
420	40	50	46	42	1300	124	156	143	130
440	42	53	48	44	1320	126	159	146	132
460	44	55	51	46	1340	127	161	147	134
480	46	58	53	48	1360	129	163	149	136
500	48	60	55	50	1380	131	165	151	138
520	49	62	57	52	1400	133	168	154	140
540	51	65	59	54	1420	135	171	156	142
560	53	67	62	56	1440	137	173	158	144
580	55	70	64	58	1460	139	175	160	146
600	57	72	66	60	1480	141	177	162	148
620	60	74	68	62	1500	143	180	164	150
640	61	77	70	64	1520	144	183	167	152
660	63	79	72	66	1540	146	185	169	154
680	65	81	75	68	1560	148	187	171	156
700	67	84	77	70	1580	150	189	173	158
720	68	87	79	72	1600	152	192	175	160
740	70	89	81	74	1620	154	195	178	162
760	72	91	83	76	1640	156	197	180	164
780	74	93	86	78	1660	158	199	182	166
800	76	96	88	80	1680	160	201	184	168
820	78	99	90	82	1700	162	204	187	170
840	80	101	92	84	1720	164	207	190	172
860	82	103	94	86	1740	165	209	192	174
880	84	105	97	88	1760	167	211	194	176

P.A.C.

RADIATION COMPUTING—Steam Heating, 12-in. Brick Walls. NO. 13-I

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RADIATION COMPUTING

Heating - Steam -
15" Brick Wall Lath, furring and plaster on inside

Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.
20	2	2	2	2	900	77	94	86	81
40	3	4	4	4	920	78	96	88	83
60	5	6	6	5	940	80	98	89	85
80	7	8	8	7	960	82	100	91	86
100	9	11	10	19	980	84	102	93	88
120	10	13	11	11	1000	85	105	95	90
140	12	15	13	13	1020	87	107	97	92
160	14	17	15	14	1040	88	109	99	94
180	15	19	17	16	1060	90	111	101	95
200	17	21	19	18	1080	92	113	103	97
220	19	23	21	20	1100	94	115	105	99
240	20	25	23	22	1120	95	117	106	101
260	22	27	25	23	1140	97	119	108	102
280	24	29	27	25	1160	99	121	110	104
300	26	32	29	27	1180	101	123	112	106
320	27	34	30	29	1200	102	126	114	108
340	29	36	32	31	1220	103	128	116	110
360	31	38	34	32	1240	106	130	118	111
380	32	40	36	34	1260	107	132	120	113
400	34	42	38	36	1280	108	135	122	115
420	36	44	40	38	1300	110	137	124	117
440	37	46	42	40	1320	112	139	126	119
460	39	48	44	41	1340	113	141	127	120
480	41	50	46	43	1360	115	143	129	122
500	43	53	48	45	1380	117	145	131	124
520	44	55	50	47	1400	119	147	133	126
540	46	57	51	49	1420	120	149	135	128
560	48	59	53	50	1440	122	151	137	130
580	49	61	55	52	1460	124	153	139	131
600	51	63	57	54	1480	125	156	141	133
620	53	65	59	56	1500	127	158	143	135
640	54	67	61	58	1520	129	160	144	137
660	56	69	63	59	1540	130	162	146	138
680	58	71	65	61	1560	132	164	148	140
700	60	73	67	63	1580	134	166	150	142
720	61	75	68	65	1600	136	168	152	144
740	63	77	70	67	1620	137	169	154	146
760	65	79	72	68	1640	139	170	156	147
780	67	81	74	70	1660	141	172	158	149
800	68	84	76	72	1680	142	174	160	151
820	70	86	78	74	1700	144	177	162	153
840	71	88	80	76	1720	146	179	164	155
860	73	90	82	77	1740	147	181	166	156
880	75	92	84	79	1760	148	183	167	158

P.M.C

RADIATION COMPUTING—Steam Heating, 15-in. Brick Walls. | NO. 13-J

Copies of this Data Sheet, printed separately, 5 cents each.

EFFICIENT HEATING *demands the* JENNINGS PUMP

DUPLEX "E" UNIT CONTINUOUS OPERATION

Public School No. 61,
Crotona Park & Charlotte St.,
New York City

Capacity each pump 65,000 sq. ft. direct radiation, air capacity 42 cubic feet per minute in addition to a water capacity of 90 gallons per minute,

The Motors are 5 Horse Power.

THE Jennings Pump consists of two independent turbine units, an air pump and a water pump. As each material is handled separately, the boiler pressure is against the water only. The air and vapor, approximately four-fifths of the volume handled, are delivered to atmosphere without back pressure. The saving in horse power is over fifty per cent. In other words, the cost of current to operate is cut in half.

Because of its compact design, this equipment can be installed in less than one-third the space necessary with other apparatus. All interior parts are bronze, supported on annular ball bearings mounted outside of casing. Moving parts revolve without contact.

Quiet, reliable operation without annoyance because of shut downs, and minimum of expense for repairs, is assured if the Jennings Hytor Vacuum Heating Pump is installed on your Vacuum Heating System.

There are many other reasons why the Jennings is being installed on practically all of the big jobs. Bulletin No. 15 gives them in detail. Write for it.

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The NASH ENGINEERING COMPANY

SOUTH NORWALK, CONN., U. S. A.

TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

Central Supply Association holds its regular summer meeting in Chicago, June 14, at the Hotel Sherman.

National "Clean Up and Paint Up" Campaign Bureau is making much of the fact that its plan was adopted in New York City for the week beginning May 1, 1922. The campaign was supported by the departments of fire, health, tenement house, police and street cleaning. Efforts are being made by the bureau to have other cities undertake similar campaigns.

Bridgeport Society of Engineers has been formed by members of the American Society of Heating and Ventilating Engineers, A. S. M. E., electrical engineers and mining and metallurgical engineers. Harry E. Harris, of the Harris Engineering Co., Bridgeport, acted as chairman of the organization meeting. A committee was appointed to draw up a charter which will be taken up at another meeting, when officers will be elected. The charter committee consists of Dr. M. C. Burt, of Burt & Hibbard; W. J. Newton, of Harvey Hubble, Inc.; and Harold T. Dow, of the Spring Perch Co. Nearly 200 members are expected to enroll before the first regular meeting.

Chicago, Ill.—It is stated that the amount of building work now going on under the terms of the Landis Award is about $40,000,000. Plans for new hotel buildings, offices, theatres, banks and other buildings, it is expected, will increase this total $30,000,000.

E. Taketomi, architect for the Department of Commerce of Japan, is visiting this country, and will also visit Canada and Europe to obtain data for the design of the proposed new Post Office building in Tokio. This will be a monumental structure. Mr. Taketomi's address at present is in care of the Japanese Embassy, Washington, D. C.

Chicago, Ill.—The Citizen's Committee to Enforce the Landis Award which laid down working conditions and wage scales in the Chicago building trades, reports that 85% of the contractors in the building line in that city have pledged themselves to abide by the award. A $3,000,000 fund is being raised to finance the operations of the committee.

Chicago, Ill.—"Good Health Week" is proposed for Chicago beginning October 23. Emphasis will be placed in the value of fresh air and correct ventilation.

Pomona, Cal.—Pomona is to have an experimental central heating plant for orchard frost protection, under the auspices of the San Antonio Fruit Exchange and the Pomona Valley Frost Protective Association, according to an announcement made by Z. T. Bell, president of the San Bernardino National Orange Show and head of the San Bernardino Gas Company, which was recently taken over by the Southern Counties Gas Company. Mr. Bell is the inventor of the heating plant. The heater is a down-blast oil burner sunk several feet in the ground, with pipe lines radiating in all directions

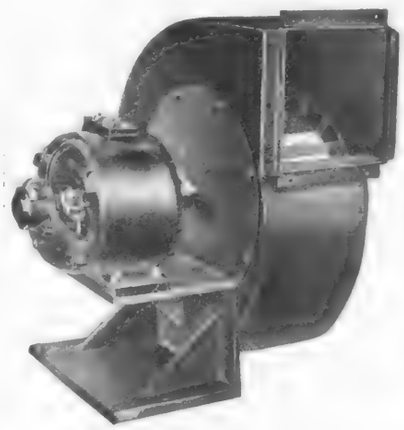
WHEN BETTER FAN PRODUCTS ARE CREATED AUTOVENT

VENTILATING INSURANCE

When You Buy or Specify

Autovent Fans or Uniblade Blowers

You are purchasing products as durable as "The Rock of Gibraltar"—and as thoroughly protected —with an unequivocal Autovent Guarantee, covering fan and motor.



Autovent Fans and Uniblade Blowers are guaranteed to render the rated capacities as listed in the performance tables in our Modern Encyclopedia of Ventilating Data. No pains or expense will ever be spared to maintain the enviable reputation we have established, namely—

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This is Our Promise To The Trade

Copies of our new 100 page Modern Encyclopedia of Ventilating Data, will soon be off the press and ready for distribution. It has been created to assist you to easily calculate and increase your sales. In writing us today for a copy of this Modern Encyclopedia of Ventilating Data, address your request to the:

Consulting Engineering Department

Autovent Fan & Blower Co., 730-738 W. Monroe St., CHICAGO

Formerly Batterman Truitt Co.

Branch Offices in Principal Cities

WE WILL MAKE THEM

from the center of the grove in which the heating plant is to be placed. For a 10-acre grove, it would take 1400 ft. of 10-in. pipe, 3000 ft. of 8-in. pipe and 3200 ft. of 6-in. pipe. With a 15 H. P. motor to operate the fan, the hot air would be circulated through the pipes in sufficient pressure and volume to displace all the air in the grove in ten minutes. A heater of this capacity would burn about 4 gal. of oil a minute.

Cleveland Engineering Institute, Cleveland, O., announces the resignation of H. C. Hewitt as president of the institute. He is succeeded by George W. Roberts. K. L. Seelbach will be the general manager. The institute conducts a course of instruction in heating and ventilating engineering.

W. L. Fleisher, chairman of the Committee on Standardization of the Heating and Piping Contractors' National Association, has been appointed one of two advisory engineers to the Industrial Board of the New York State Department of Labor, to draw up a code of requirements for laundries, covering sanitation, comfort, heating, ventilating, humidity and safety.

Coal Situation as of April 22, 1922, is the title of a pamphlet containing information as to quantities of coal being produced and supplies on hand at that time in both union and non-union fields. In the pamphlet it is estimated that a coal shortage in anthracite coal would not occur for several months, while for bituminous coal it would begin to be felt in approximately ten weeks from April 1.

Dwight P. Robinson & Co., New York, have been awarded the contract for the construction of a building to accommodate American commercial exhibits at the Brazilian Centennial Exposition, to be held in Rio Janeiro, beginning September 7. The building, which will be the "unofficial" exhibit building, will be constructed of American materials, as far as possible.

Elements of Cost in the Retail Distribution of Coal, taken from a survey of Seattle, published by the University of Washington in 1920, are presented in chart form by the Chamber of Commerce of the United States.

Julius L. Hecht, president of the National District Heating Association in 1921, has been elected president of the Western Society of Engineers.

Asbestos deposits have been discovered recently in six different States of Mexico. Other deposits exist and have

SELF-COOLED UNIVERSAL PROPELLER FANS BLOWERS

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

All *Ilg Blowers* are equipped with the improved Ilg multi-blade wheel. The blades are made of whiting ribbon steel, electrically welded to steel retaining rings, hand forged, wrought iron spider and malleable iron Central Suspension Hub

Architects and engineers will be especially interested in the New Ilg 1922 Catalog - 200 pages of diagrams and illustrations—a graphic treatise on Correct Ventilation, containing valuable data on the simple solution of all ventilating problems. Send for it.

IN mechanical construction *Ilg Blowers* are a real innovation. They possess maximum strength with minimum weight, insuring economical operation. All parts are interchangeable — no pedestal or foundation of any kind is required.

These features, together with central suspension and drive define true economy in power consumption. Your safeguard lies in the fact that we build the complete unit, which gives you a guarantee covering both blower and motor.

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

Ventilation FOR OFFICES · STORES · FACTORIES · PUBLIC BUILDINGS · RESTAURANTS · THEATRES · HOUSES · ETC

GOOD HEALTH WEEK Oct. 23-30 1922

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Cleveland's Pride

Clark, MacMullen & Riley
Consulting Engineers

J. H. MacDowell, Architect

"Buffalo"

Cleveland's Public Auditorium, which is fast nearing completion, marks the first step toward one of the finest groups of public buildings in America.

Built to endure they will serve as a lasting tribute to the civic spirit that has aided so materially in the rapid growth of America's cities.

We are proud that Buffalo Fans and Carrier Air Washers were chosen to handle the entire Heating and Ventilating for Cleveland's Public Auditorium.

Every Heating and Ventilating Engineer should have our catalog 700-36

Buffalo Forge Company

Buffalo **New York**

New York Boston Philadelphia Pittsburgh Cleveland Chicago Los Angeles

been known for some time in Lower California and in some of the northern States.

Copper and Brass Research Association reports that as the result of a survey made by the association, it is able to state that the aggregate annual repair bill of home owners in this country will this year amount to $540,041,769 for one item alone, the replacement of rusted sheet-metal work, including leaders and gutters, valleys and flashings. The cost of replacement of rusted iron and steel pipe in plumbing work is placed at $86,500,000 annually, making the total annual rust bill of about $626,500,000.

April Building Construction records broke all previous records, according to the F. W. Dodge Company. Contracts awarded in the 27 northeastern States during the month amounted to $353,192,000. The previous high record was for the month of July, 1919, the figure being $317,698,000. There was an increase in every important class of construction projects in April, even in industrial plants, which has been the last group to pick up. Residential building continues in the lead, amounting in April to $132,478,000, or 37% of the month's total. The New England figures were $44,510,000, an increase of $5,000,000 over the previous high record for the district. Another record was made in New York State and northern New Jersey where the figures came to $115,502,000, nearly $27,000,000 above the previous high record. In the Middle Atlantic States the total, $48,663,000, represented an increase of 9% over the preceding month and 78% over April, 1921. In the Pittsburgh district, the figures, $46,478,000, were 23% greater than for the previous month and 10% greater than for April, 1921. The Central West reported a total of $90,023,000, 6% ahead of last month's total and 20% ahead of the corresponding month last year. In the Northwest the figures came to $7,986,000, 20% below those for the preceding month but 4% over those for April, 1921.

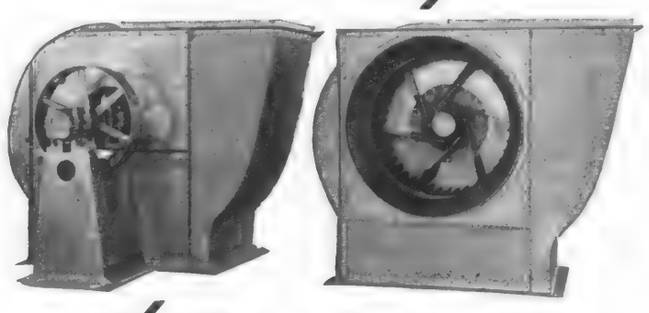
New York.—That the manufacturers of the United States are increasing their activities is evidenced by official figures of the importation of manufactured material and also the official figures of the export of manufactures. March importation of manufacturing material, says the Trade Record of the National City Bank of New York, showed a larger value than at any time in the past eighteen months, with the single exception of December, 1921.

Sesqui-Centennial Exhibition Association, of Philadelphia, which is in charge of the preliminary arrangements for the exhibition to be held in that city in 1926, to mark the 150th anniversary of the signing of the Declaration of Independence, has published a report of the Committee of the Engineers' Club upon the availability of the different sites that are being considered. The committee recommends the Fairmount Park, Parkway Site, near the former Centennial site.

Albany, N. Y.—Plans for construction work on industrial buildings in the State, outside of Greater New York which were submitted to the Engineering Division of the Department of Labor for approval during the first quarter of this year, are nearly double, in the expenditures proposed, those for the corresponding quarter in 1921. This year's plans call for expenditures aggregating $4,022,618, as against $2,191,446 in 1921. Over $3,736,000 of the whole amount is for new buildings.

Frank T. Chapman who, as announced in last month's issue, has resigned as district manager of the Industrial Department of the American Radiator Company, having been in charge of industrial engineering and promotion work for that company in the eastern territory since 1909, will take a six months' vacation before again taking up active business. Mr. Chapman is active in the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers, being on the executive committee, Metropolitan Section, of the A. S. M. E. and having served four years on the council of the A. S. H. V. E. His present address is 84 Park Street, Montclair, N. J. and also, for mail, at the Engineers' Club, New York.

Sioux City, Ia.—A proposed new warm-air furnace ordinance has been presented to the city council by Councilman Tom L. Taggart. It provides for the proper installation of furnaces



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MULTIBLADE FANS

Where large volumes of air are to be handled at comparatively low pressures such as in heating and ventilating systems LEHIGH Multiblade Fans are guaranteed to be equal to, if not superior, to any other fans on the market.

A study of the capacity tables and characteristic curves in the Lehigh catalogue clearly proves this fact.

To further substantiate this statement, your attention is directed to the large inlet and outlet, the cone shaped hub, the absence of stay-rods, the rigid construction secured by special blades running tangent from the hub to the periphery of the wheel and also various other details.

May we send you a copy of our catalogue?

HERSH BROTHERS CO.

654 Mill Street ALLENTOWN, PA.

THE METROPOLITAN ST. PAUL
L.N. SCOTT MANAGER
LEADING THEATRES OF TWIN CITIES
THE METROPOLITAN MINNEAPOLIS
ST. PAUL, MINN.,
May 19, 1920.
American Blower Co.,
Detroit, Michigan.
Gentlemen:
We installed, in the engine room of our Metropolitan Opera House Building, St. Paul, Your Blower Heating and Ventilating System, and have operated it in connection with our office building and theatre for a period of nearly thirty years. Our theatre was opened and in operation beginning Dec. 29th, 1890.
Your apparatus has given excellent satisfaction for both heating and cooling our theatre auditorium, and we take pleasure in recommending your equipment to anyone who may have occasion to use it.
Yours truly,
L. N. Scott PRES.
METROPOLITAN OPERA HOUSE CO.

"Sirocco" Ventilation for Thirty-one Years

That "Sirocco" Products are reliable and trustworthy—as well as efficient— is evidenced from the fact that long-continued service is a dominating characteristic emphasized in scores of unsolicited testimonial letters received from theater owners and managers throughout the country.

In the Metropolitan Opera House of St. Paul you will find striking evidence of the dependability of "Sirocco" equipment—the installation having been made 31 years ago.

And the president of the theater-office building, L. N. Scott, says: "Your apparatus has given excellent satisfaction for both heating and cooling our theater auditorium, and we take pleasure in recommending your equipment to anyone who may have occasion to use it."

If you are considering the installation of heating and ventilating equipment in a theater we will gladly submit recommendations. Many years of practical experience have enabled our engineers to cooperate intelligently with theater owners, architects and heating and ventilating contractors. No matter how large or how small the theater, there is a "Sirocco" installation for that particular size building.

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONT.

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"Sirocco" Products

TRADE MARK

BLOWERS • EXHAUSTERS • VENTILATING FANS • AIR WASHERS • ENGINES

FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

under the supervision of a city inspector. It is stated that the fees from furnace inspections will more than pay the salary of the furnace inspector, which will be a new feature of the city building department. The ordinance has been given first and second readings.

National Council of Traveling Salesmen's Associations, which has its headquarters in New York at the Claridge Hotel, Broadway and 43rd Street, announces that its first annual convention will be held in Cincinnati, O., October 9-11, 1922. All traveling salesmen's associations throughout the country are invited to send delegations to the national gathering. Among the objects of the association is the securing of an interchangeable mileage book at wholesale rates. This bill has passed the United States Senate and is now being considered by the Interstate and Foreign Commerce Committee of the House of Representatives. The association is also trying to eliminate the Pullman car surcharge.

Manufacturers' Notes.

Utica Heater Co., Utica, N. Y., has received an order for five 23-section Super-Smokeless boilers for the Wyandotte High School, in Detroit, Mich.

Swisher & Mauer, manufacturers' representative, Milwaukee, Wis., announce the removal of their office to their new ground-floor location at 495 East Water Street, Milwaukee. This company is the exclusive representative for Wisconsin of the Chicago Pump Company and the Utica Heater Company.

National Tube Co., Pittsburgh, Pa., will build a $15,000,000 plant in Gary, Ind., according to an official announcement by the company. Work will start at once and it is expected that the plant will be ready for operation in about 18 months.

Thermal Appliance Co., New York, has moved its general offices to the Canadian Pacific Building, 342 Madison Avenue.

American Radiator Co., Chicago, Ill., has appointed a committee of its directors to go to Europe to inspect the company's plant abroad and study the problems of management that have arisen through the depreciation of foreign exchange and other abnormal conditions. The committee is headed by President Clarence M. Woolley and includes James B. Forgan, chairman of the board of directors of the First National Bank, of Chicago. Among the countries to be visited are England, France, Italy, Germany and Austria.

Honeywell Heating Specialties Co., Wabash, Ind., announces that it has acquired the interests of the Jewell Mfg. Co., of Auburn, N. Y., manufacturer of the old and well-known line of Jewell heat controllers. All of the stock of the Jewell company, consisting of completed regulators, parts in process and raw materials, together with all tools and manufacturing equipment, has been shipped from Auburn to Wabash and hereafter Jewell regulators will be supplied to the trade by the Honeywell Heating Specialties Company. During the past seven years the Honeywell company has been developing an electric motor for automatic temperature control purposes, built on an entirely different principle from that heretofore employed. This development, it is stated, has now been completed and the company is preparing for the manufacture of the motors.

Central Station Heating Notes.

Hibbing, Minn., Water and Light Department is making an extension to its heating system. The work is in charge of Charles Foster, heating engineer, 512 Sellwood Bldg., Duluth, Minn.

Bucyrus, Ohio.—The Ohio Power Co., after a canvass of the city, has announced that it will defer the installation of its proposed central heating system for an indefinite period. It was stated that the canvass showed that a majority of the customers were not ready to assume the additional expense in connection with the installation of a new system at this time. It is figured that 70,000 sq. ft. of radiation contracted for will be necessary to justify the company in proceeding with the work of installation.

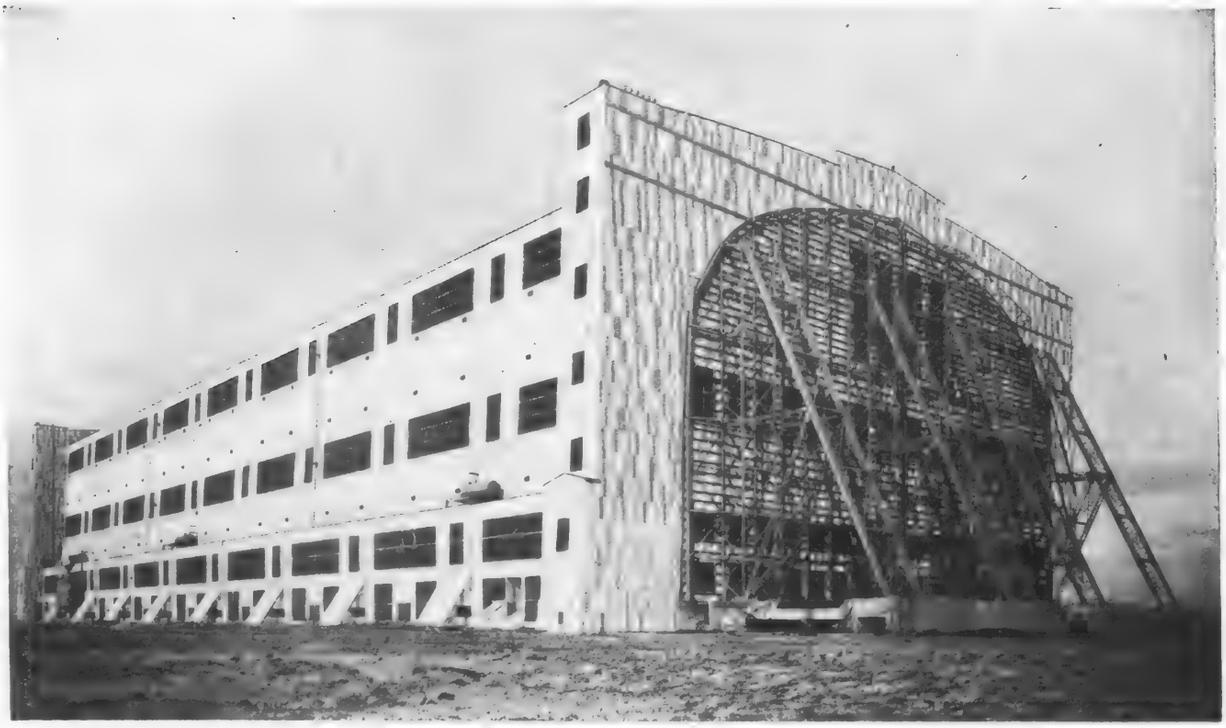
A fan will not run itself

and, therefore, bases its service on its source of power. Drive with a BROWNELL FAN ENGINE and obtain maximum fan service. The consistent performance of this simple, compact, rigid, side crank steam engine has given it an enviable reputation among fan users.

This engine is only one example of the high class products which are the results of experience gained in over half a century of manufacturing power plant equipment.

Send for Bulletin No. E5.

THE BROWNELL COMPANY
DAYTON - OHIO
ESTABLISHED 1855



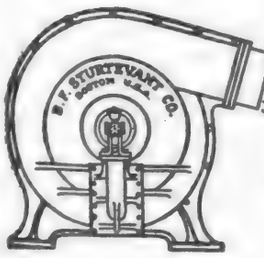
Heating the Hangar at Lakehurst

THE primary heating of this enormous structure (1000 ft. long and 200 ft. high) was accomplished by nine large Sturtevant Fan Heating Units; they brought the air in from outside, however cold, and heated it to 50 degrees.

The amount of air handled by these huge units totalled 20,820,000 cubic feet per hour.

The equipment for this hangar included Sturtevant Fans, Sturtevant Reduction Gear Transmissions and Sturtevant Turbines.

Whenever conditions of an unusual character arise Sturtevant engineers are usually called in, because there are over 60 years experience back of them in putting air to work.



Sturtevant

REG. U.S. PAT. OFF.

PUTS AIR TO WORK

645

HYDE PARK, BOSTON MASS.

Bloomington, Ill.—It was expected that a decision in the case of the Bloomington and Normal Railway and Light Co. on its proposal to abandon the hot water piping system in Bloomington would be rendered the latter part of May. In connection with the company's statement that it could not profitably operate the hot water system, a proposal was submitted by 32 of the objecting property owners offering to take the system off the hands of the company and operate it themselves. Counsel for the company stated that he was not in a position to accept or reject the offer. The proposal made by the property owners follows:

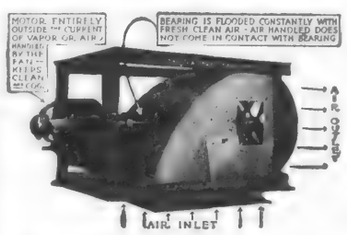
"From the record thus far made in this hearing on the petition of the Bloomington and Normal Railway and Light Company for an order authorizing it to discontinue its hot water service in the city of Bloomington, it appears that the company has taken the position that their hot water mains and service pipes are in a dilapidated condition, worthless to them and unfit to render further heat service to the buildings of their patrons, owners of ninety buildings in said city, equipped with 80,500 sq. ft. of hot water radiation and piping, and their tenants, and that if they obtain the order for which they petition they will not attempt to take up and salvage the mains and service pipes, but will leave them in the streets, abandoning them as a total loss.

"If such in fact is the case and such conditions are possible in view of the further fact that said hot water mains and service pipes have given us satisfactory service throughout the winter season just closing, and in previous seasons as well, we suggest for ourselves and all other users of hot water heat service that in case your honorable body (the Illinois commerce commission) should favorably consider the company's petition, that such favorable consideration be upon the express condition to be entered on record that the petitioner donate to us in their present condition, just as they now are, all of their hot water street mains, service pipes and appurtenances, and further to us or to a company which we will organize, their franchise for the hot water heating, to the end that we, the owners of the buildings now taking their hot water heat service, may erect a suitable building and equip it with boilers and pumps with which to continue to furnish heat service to our buildings and enable us to save our more than $100,000 investment and avoid a further investment of as much more for boilers, new radiators and service pipe, and to furnish the owners of other buildings who may wish it with hot water heat at a reasonable charge under the regulation of your honorable body and the city authorities of the city of Bloomington.

Fairmont, Minn., is agitating the question of installing a central heating plant in that place at an estimated cost of about $80,000.

Vancouver, Wash.—The recent purchase of the Star Brewery property in Vancouver, Wash., by the Vancouver Steam and Mfg. Co., opens the way for the conversion of the property to uses of importance to the city of Vancouver. One of the major operations of the company will be a steam heating plant to furnish service to buildings in the downstown district of Vancouver and an underground distribution system will be installed for this purpose. Construction of the heating plant and mains will begin in June, according to T. V. Anreiter, and it is expected will be in full operation by October. The purchase represents an investment of approximately $300,000. Owing to the seasonal service of refrigerating and steam heating, it would be difficult for either industry to operate profitably, but with the combination of the two, the slack season of cold storage will be balanced by the heating operation. Engineering details of the new enterprise are being worked out by G. E. Reed of Portland. The company is headed by Judge M. M. Connor, C. J. McCracken and T. V. Anreiter. It is also heavily backed by the U. S. Na-

WING-SCRUPLEX EXHAUSTER


MOTOR ENTIRELY OUTSIDE THE CURRENT OF VAPOR OR AIR HANDLED BY THE FAN—KEEPS CLEAN
BEARING IS FLOODED CONSTANTLY WITH FRESH CLEAN AIR - AIR HANDLED DOES NOT COME IN CONTACT WITH BEARING
AIR OUTLET
AIR INLET

Wing-Scruplex Exhauster, specially designed for removing vapors, heated air, chemical fumes, etc., in factories, industrial plants, etc.

For One Concern We Figured a Saving of 48 Horsepower

by substituting 25 *Wing-Scruplex Exhausters* for 25 exhausters of another type.

We would like to tell you how *Wing-Scruplex Exhausters* can save money for your clients on present or contemplated installations.

Write for Bulletin 58B

L. J. Wing Mfg. Co.

FANS and BLOWERS | UNIT HEATERS DAMPER REGULATORS | SMALL TURBINES

Hudson and 13th Sts., New York

WING-SCRUPLEX FAN

Wing-Scruplex (*screw propeller*) Fan for general ventilation of stores, factories, offices, homes, etc.

Vento Return Line Valve

for Vacuum and Vapor Heating Systems is a fuel-saver from the moment that it is put to work on the heating system. It never fails in its promise to make the heating system give dollar-for-dollar service for every ounce of fuel consumed.
Our latest Booklet, "The Perfect Heating System," will be mailed on request to any heating engineer.

WM. S. HAINES & COMPANY
PHILADELPHIA

Steam Traps **Steam Separators** **Oil Separators** **Strainers**
Air Traps **Exhaust Heads** **Boiler Alarm Water Columns**

WRIGHT WA Standard with STEAM USERS SINCE '94 **AUSTIN**

WRIGHT-AUSTIN CO. **DETROIT, MICHIGAN**

Peerless Ventilator

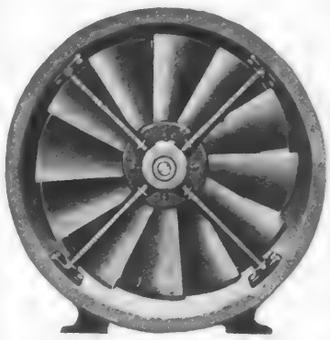
BUILT RIGHT RUN RIGHT

The New York Blower Co.

Chicago, Ill. La Porte, Ind.

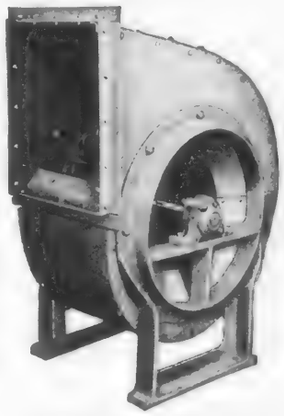
Peerless Air Washer

We manufacture a complete line of fan equipment and appurtenances. By concentrating on this one class of products we are able to make them better every year.



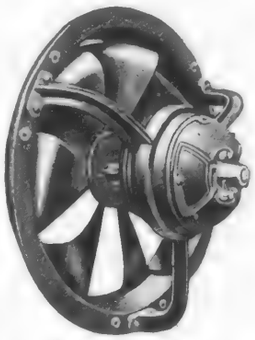
Pulley Driven Disc Fan for Mines

The old fallacy that fan equipment was a luxury is now known to be untrue; it is an economical necessity. We can give actual installations in all kinds of industries where through the wise employment of fan equipment manufacturers have improved the quality of their product, and increased production with a reduction in factory cost.

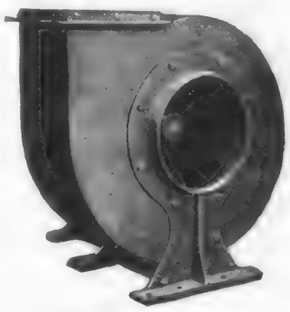


Type "C" Seri-Vane Fan

If you are interested in drying, humidifying, heating, ventilating, mechanical draft, removal of shavings or similar installations, please communicate with us. If we cannot honestly prove facts to you showing the benefits that will follow from an installation for your special problem, we will frankly so state.



Motor Driven Propeller Fan

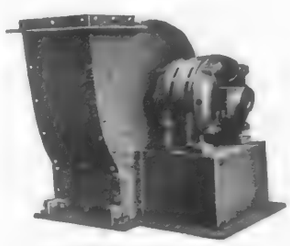


Slow Speed Planing Mill Exhauster

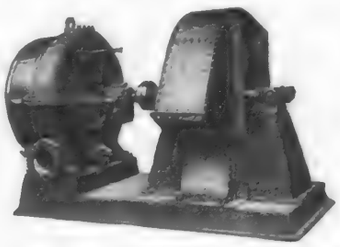
The New York Blower Co.

Chicago, Ill. La Porte, Ind.

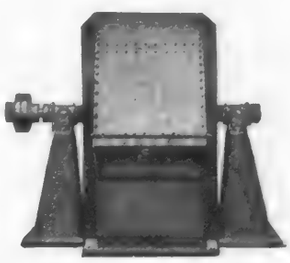
Branch Offices in Principal Cities



High Speed Type "C" Seri-Vane Fan



High Pressure Blower Direct Connected to Turbine



Stoker Fan

tional Bank and other financial institutions. The financing of the new system will be arranged through the issue of $75,000 in 8% gold notes.

Aledo, Ill.—Owing to the fact that the city steam plant is in need of rehabilitation, it is being proposed that several block systems be installed in preference to re-building the whole plant. The franchise has another year to run.

Trayer, Ia.—At a meeting of the business men of Trayer to consider the remodelling of the Trayer electric power and steam heating plant, estimates were received that the re-building of the large pipes under the business street would cost about $20,000. The question is being debated as to who should pay for the re-building of the mains. The council has proceeded on the theory that the steam heat users should meet the entire expense. A committee was appointed by Mayor Findlay to investigate the needs of the plant. This committee consists of T. J. McGinnis, J. W. Potter and E. E. Taylor. According to a member of the financial committee of the city council, the plant, during the fiscal year ending April 1, 1922, made a net profit of about $130, after paying all interest due on bonds and warrants and setting aside $3,000 for depreciation. The financial report on the plant's operation, shows that $17,482 spent for coal in the year ending April 1, $6,181, or more than a third, was met by the income from heat.

New Firms and Business Changes

Garford Foundries Co., Elyria, O., has taken over the manufacture of the Bernhard boiler designed by J. B. Bernhard. Mr. Bernhard will act as director of sales, with headquarters at 1836 Euclid Avenue, Cleveland. The president of the Garford Foundries Co. is A. L. Garford; vice-president and secretary, Walter Brown; treasurer, W. H. Henson.

Deegan-Seifert Co., 5224 Blanche Avenue, Cleveland, O., is the title of a new heating and plumbing and mill supply house in Cleveland, O. President, J. M. Deegan, formerly sales manager for the Hiram Rivitz Co., Cleveland, O.; secretary-treasurer, J. F. Siefert, also formerly with the Hiram Rivitz Company.

Hadlow, Hick and Co., 750 Prospect Ave., Cleveland, O., has been organized as an engineering firm to specialize in the designing, supervision and construction of commercial and industrial buildings and the power plants for all purposes. The firm is composed of H. Ralph Hadlow, formerly vice-president and general manager of the Watson Engineering Company, and Noel H. Hick, former director and engineer in charge of building designing for the Watson Engineering Company.

Contracts Awarded.

Thomas Heating Co., Racine, Wis., heating Campion College at Prairie du Chien, Wis. The contract includes the installation of new boilers in a new boiler house, new tunnel lines, and the remodeling of the heating system for about 600 radiators in six or seven buildings. The Moline heat system of steam circulation will be used.

Peter Johnson & Sons, Des Moines, Ia., heating high school building in Decorah for $20,342.

McEwan-East Plumbing and Heating Co., Trinidad, Colo., heating Centennial School addition, high school gymnasium and high school auditorium in Trinidad.

Providence, R. I.—Bids were received as follows for the heating and ventilating of the Sackett Street school in Providence: Files Engineering Co., $25,974; Smith-Gibbs Co., $29,418; M. A. Dame & Son, $28,800; Edward J. Sullivan, $24,820; Frank Dupuis & Co., $25,990; Reardon Bros., $27,207; Haslan Heating Co., $29,047; John F. Cox Heating Co., $27,990; Grinnell Co., $27,825.

Pharo Heating Co., Madison, Wis., heating and ventilating new school building in Oconomowoc for $16,911. The contract for the system of temperature regulation and humidity control was awarded to the Johnson Service Co., Milwaukee, Wisc., at its bid of $3,876. Other bids were as follows: The Paul B. Muller Co., $17,845; Otto Biefield Co., $17,421; Kissel Brothers, $18,225; Industrial Heating & Engineering Co., $16,850; Downey Heating & Supply Co. $17,468; Thomas Heating

DEPENDABILITY!
SYNONYMOUS
WITH
STANDARD
"Metallic"
THERMOMETERS

DURABLE
DEPENDABLE
EASY TO READ
PRACTICALLY INDESTRUCTIBLE
SENSITIVE TO CHANGING TEMPERATURES

WARRANTED ACCURATE

Standard "Metallic" Thermometers are built for long and reliable service—backed by our experience of nearly forty years as Thermometer Manufacturers—made in INDICATING or RECORDING type, with ANGLE or STRAIGHT STEM. Write us about your requirements or send for descriptive booklet. We have a variety of sizes and models from which you can select your STANDARD "Metallic" THERMOMETERS.

STANDARD THERMOMETER CO.
Clifton St., Boston 19, Mass.
Nearly Forty Years as Thermometer Manufacturers

LOWERING
THE
PRICE
OF STEAM FITTINC
BY USING
CHITT ADJUSTABLE
RADIATOR HANGERS

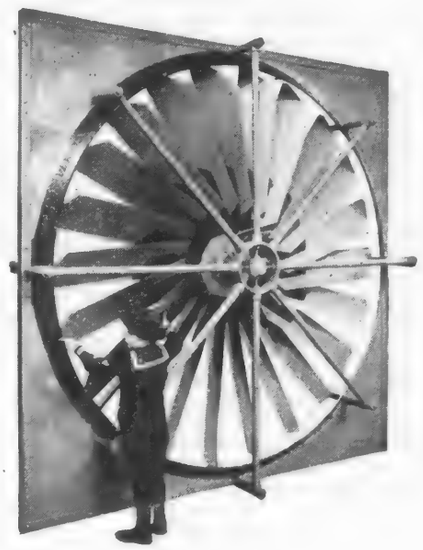
THEY SAVE YOU TIME
MONEY AND LABOR

WRITE FOR CIRCULAR
AND PRICES

HEATING SPECIALTY CO.
1232 HALL AVE., LAKEWOOD
CLEVELAND, OHIO

PATENTED PATENTED

In a class by itself—



Typhoons are used wherever the most is demanded for low pressure work.

The Typhoon cone ring, self-aligning ball bearings and other Typhoon features insure the superior air volume and low power consumption for which Typhoons are noted.

No attention is required except for occasional greasing of the self-aligning ball bearings.

The Typhoon square frame makes installation easy—and economical.

Made with belt drive in sizes from 2 ft. to 12 ft.; and direct-connected to G. E. motors in sizes from 2 ft. to 4 ft.

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PHILADELPHIA, PA.
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TYPHOON FAN COMPANY

ERNST GLANTZBERG, President

345 WEST 39th STREET, NEW YORK, N. Y.

LOS ANGELES, CAL.
NEW ORLEANS, LA.
RALEIGH, N. C.

Co., $17,687; Kehr Bros., $18,452; Juttner Heating Co., $19,200; American Heating Co., $17,224.

Springfield Plumbing and Heating Co., Springfield, Mo., heating and plumbing new $263,000 model training school for the Springfield Teachers College. Also heating dormitory building for the insane at Alexandria, La. for $52,000.

Eichler Heating Co., Jefferson City, Mo., heating and ventilating Lincoln University building in Lincoln, for $13,777.

Hipskind Plumbing and Heating Co., Wabash, Ind., heating, plumbing and electric work for the new school building in North Manchester, Ind.

A. S. Hunter & Son, Willard, Ohio, heating and plumbing new $125,000 high school in Sandusky for $21,640; also, heating and plumbing new Port Clinton high school for $22,000. Other bids for the Port Clinton school were as follows: W. G. Coyle, $25,000; Ohler & Holzhauer, $23,926; A. S. Hunter & Son, $21,640; A. W. Smith, $23,931; Barnes & Clask, $26,000; R. T. Withers, $23,500; Bryan Heating Co., $24,998; Carey and Hall, $25,000; Jones & Kinn, heating only, $15,925; Thatcher Co., $16,545.

Rockford, Ill.—Bids for the heating and ventilating of the West Side Junior High School included one for $104,992 from Swords Bros. Co., Rockford, Ill. A discussion over the equipment to be used led to the postponement of the award of the contract.

Sodemann Heat and Power Co., St. Louis, Mo., was lowest of nine bidders at $164,767 for the heating and ventilating of the Washington Gladden-Joseph Sullivant High School buildings in Columbus, O. Two bidders out of ten competing tied on the temperature regulation contract. They were the Johnson Service Company and the Hoffman-Wolfe Co., Columbus, each with bids of $16,500. The Wm. H. Conklin Company was a low bidder for the combined plumbing, sewering, gas fitting, heating and ventilation at $197,849. In order to make the latter bids acceptable, it was necessary for Mr. Conklin to resign as a member of the Columbus Board of Education.

W. G. Cornell Co., New York, heating, ventilating and plumbing New Masonic Temple in Aurora, Ill., for $50,000.

Philadelphia Steam Heating Co., general steam piping work in connection with the new laundry equipment of the U. S. Quartermaster's Department, at 21st St. and Oregon Ave., Philadelphia.

Lewiston, Idaho.—Charles Hahn, Lewiston, was low bidder for the heating and plumbing of the new Clarkston high school. His bid was $11,591. Other bidders were, Clarkston Plumbing Shop, $11,817; Empire Plumbing and Heating Co., Lewiston, $12,930.

Muncie, Ind.—Earl L. Clevenger, Muncie, Ind., heating and ventilating new Emerson school in Munsey for $19,300. Other bids were as follows: Philip Stauff, Muncie, $22,885; J. A. Gallivan, Muncie, $24,275; W. H. Johnson and Son Company, Indianapolis, $20,948; Hutzel and Company, Muncie, $19,420.

Richmond, Cal.—The Scott Co., Richmond, Cal., was low bidder at $31,998 for the heating and ventilating of the Roosevelt, Jr. high school in Richmond. Bids were as follows: Nottinghan, $32,666; Hateley and Hateley, $34,995; Carl Doell, $34,195; J. I. Collins, $35,251; Atlas Heating and Ventilating Co., $36,663.

New Incorporations.

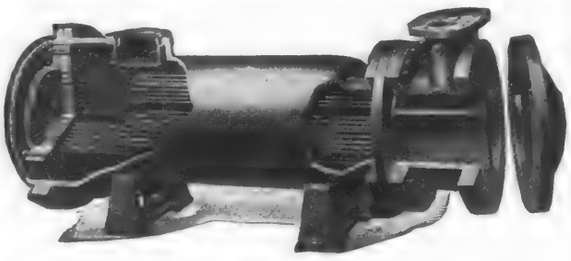
York Plumbing and Heating Co., York Harbor, Me., organized to conduct a heating and plumbing contracting business. The principal is Morris M. Randall, formerly of Kittery, Me.

J. L. Purcell, Inc., 4060 Trumbull St., Hartford, Conn., capital $100,000 to take over the heating and plumbing supply business of J. L. Purcell. Incorporators, J. L. Purcell, F. J. Murphy and E. M. Day, all of Hartford.

Service Heating and Ventilating Co., 2922 West Grand Ave., Chicago, capital $10,000, to manufacture and deal in metal roofing material, ventilators, etc. Incorporators, John H. O'Neil, Arthur M. Driscoll, Martha Weiss and Daniel A. Driscoll.

Lorentz Plumbing and Heating Co., Cleveland, O., capital $10,000. Incorporators, George A. Lorentz, George

Perfect
Hot Water Service



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Instantaneous Heater

Uses either live or exhaust steam
Send for Bulletin 231

THE GRISCOM-RUSSELL CO.
2155 West Street Building
NEW YORK

FOR SALE

NO. 20 KEWANEE HEATING BOILERS, Brick set type arranged for portable setting. Length over all 19'6". Heating Capacity: Steam—14,000 sq. ft. Hot-Water-23-100 sq. ft.

Eight of these Boilers are offered at a fraction of their real value. Removed from Government Buildings only used a few months. Boilers are therefore 95% new.

THIS IS A TREMENDOUS OPPORTUNITY FOR CONTRACTORS. ALSO OFFER LARGE QUANTITY OF VALVES, FITTINGS AND BOYLSTON STEAM-TRAPS AT MONEY SAVING PRICES.

Byron E. Veatch, Trustee
Post Office: Great Lakes, Ill.
Telegraphic Address: Waukegan, Ill.

James M. Seymour

Established 1888

Lawrence St., Mechanic St. and Kirk Place

Newark, New Jersey, U.S.A.

PROPELLOR TYPE FANS

Patented

Many styles for many kinds of service. Low pressure Fans that deliver immense volumes of air at low velocity.

Cone cased Fans for higher pressures, Extreme Fans for high pressure and high velocity.

Compound Fans from 11 feet in diameter to 24 feet in diameter for Mine Ventilation.

Hyatt Roller Bearings. Anti-Friction Metallic wick, self-oiling bearings, and Ball Bearings if the purchaser prefers.

AUDITORIUM FANS

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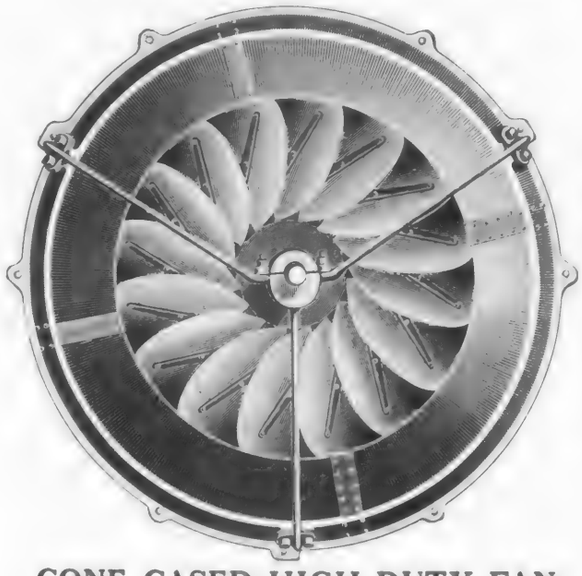

CONE CASED HIGH DUTY FAN

PRICE LIST

AUDITORIUM FANS

		Single Fan	Twin Fans
24	Inch,	$ 50.00	$ 90.00
30	"	65.00	120.00
36	"	85.00	160.00
42	"	100.00	190.00
48	"	125.00	225.00
54	"	150.00	275.00
60	"	175.00	325.00
72	"	225.00	400.00
84	"	275.00	500.00
96	"	325.00	600.00
108	"	400.00	750.00
120	"	475.00	900.00

SEYMOUR FANS are not an experiment. Over 100,000 now in service. Built of the best materials. Good Workmanship. Commercially Attractive Prices.

W. Lorentz, Helene Lorentz, F. William Enzenberger and J. W. Little.

Business Chances.

Davenport, Ia.—The Lend-a-Hand Club for girls and women is about to build a three-story clubhouse, large enough to accommodate 90 girls. The clubhouse will have a swimming pool, gymnasium and cafeteria with a capacity of 500 persons per hour. It will be located at Main and Front Streets and will cost $125,000. J. Frank Nebergall & Son, have the general contract.

Washington, D. C.—Proposals were opened by the Supervising Architect of the Treasury Department, May 1, for the construction of 26 buildings for the U. S. Veterans Hospital, Tuskegee, Ala., including separate bids for the mechanical equipment.

U. S. Public Health Service on Overheating in Factories.

The commonest evil in air conditioning in factories, says the U. S. Public Health Service, in a recent report, is the slight but highly objectionable overheating which obtains in ordinary window-ventilated work-rooms where there is no marked overcrowding and no special process tending to overheat or vitiate the air. This evil can commonly be controlled by watching the thermometer, by common sense regulation of the artificial heat supply and the use of windows before and during the shift.

Heat hazards of high degree can not be summed up so simply. In cool weather, says the report, they can be adequately controlled by properly designed and operated systems of fan ventilation; but in summer time, although they can be mitigated by ventilating systems that produce vigorous air movement, they cannot be fully controlled except at prohibitive expense and must therefore, in general, be accepted as an unavoidable incident, of the employment. The effects, however, may be minimized by short spells or work alternating with rest periods.

"A Problem in Unequal Expansion of Pipe Lines."

In the interesting item appearing in THE HEATING AND VENTILATING MAGAZINE for March, telling of the difficulties encountered in the way of broken flanges when steam was turned into a 18-in. low-pressure steam line, Fig. 3 was presented as illustrating an auxiliary warming steam line, with 1-in. connections. As will be readily seen, this illustration is a detail of the sketch shown in Fig. 1, of the pipe line in question.

Webster City Boiler Works has been established in Webster City, Ia., by E. Ermels who will manufacture the new type of boiler which he patented some time ago. Quarters have been taken in the building formerly occupied by the Central Heating Company on Second Street. The new company will also do a general boiler repair business, and heavy sheet-iron work, such as factory smoke stacks and steel tanks.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

Engineer Wanted—An old, established concern, making a specialty of industrial power piping, heating, ventilating and fire protection, desires the services of a young engineer having had four or five years of practical experience along the above lines. Permanent position with splendid opportunity for advancement is offered in this position. In writing about this position applicant should state fully his experience and positions occupied. Address reply to N. M. Donovan, 1102 Old South Bldg., Boston, Mass.

Position Wanted.—Sales engineer, experienced in air conditioning, drying, blast heating and ventilation, desires representation for eastern territory. Graduate mechanical engineer, thoroughly familiar with plant operation. Capable of managing branch office. Excellent references. Address, Box No. 17, care of Heating and Ventilating Magazine.

For many jobs—

especially theatres, factories and laundries—the low pressure Monsoon Multiblade Disc Fan is the ideal type.

Low in cost and power consumption, high in air volume. Equipped with SKF self-aligning ball bearings.

Monsoon Cooling System, Inc.
71 No. 6 Street, Brooklyn, N. Y.

FEDERAL RESERVE BANK, BOSTON MASS.

Equipped With

MASSACHUSETTS AIR WASHERS

Our apparatus is installed in many other prominent buildings including, the Woolworth Building, N. Y. Commodore Hotel, N. Y., New York Post Office, State Capitol, Boston, John Hancock Bldg., Boston.

Massachusetts Blower Company
Watertown, Mass.
Sales Offices in Principal Cities

Cycloidal
MULTIVANE FANS
TRADE MARK

Heating and
Ventilating
Apparatus
Fans and
Blowers

Garden City Fan Co.
Manufacturers since 1879
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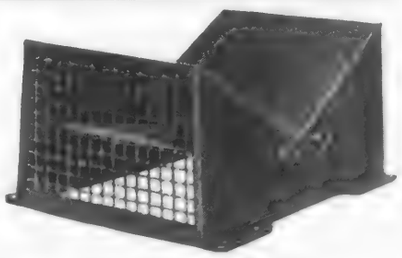


14" long 7" wide 6" high at ends.

The Camelback —Air Diffuser

is something comparatively new but already architects and heating and ventilating engineers have found that by its use the desired volume of fresh air is introduced and distributed throughtout the auditorium at a minimum of cost and friction loss.

BECAUSE

1. Less duct work is required, saving a great expense in masonry.
2. Its construction of two way air delivery at ends, permits the discharge of the maximum quantity of air with the minimum number of diffusers.
3. Its angular shape makes it uncomfortable as a foot rest.
4. Friction loss is negligible.
5. It admits of the use of the lowest slung chair seat.
6. It is made of heavy cast iron with wire screen over ends, and is guaranteed to last.
7. It has two controlling dampers, regulated independently of each other and is furnished without dampers if desired.

The Comfortable Theatre

Proper ventilation in summer and sufficient heating in winter go to make the theatre comfortable and that is vital to its success. Each spectator in the auditorium must be made as comfortable as possible when it comes to warmth and air.

With that purpose in mind the "Camelback" Air Diffuser was built. The devise is simple, orginal and reliable, an unbeatable combination. Every Architect and Engineer owes it to his clients to be well informed on latest heating and ventilating practices. For that reason you should be familiar with the "Camelback."

Send for Blueprints

Knowles Mushroom Ventilator Co.
202-204 Franklin St. New York City

A Breath of Rain-Washed Air

Did You EVER

open the window after a summer shower and fill your lungs with deep inhalations of pure rain-washed air?

This FREE BOOK

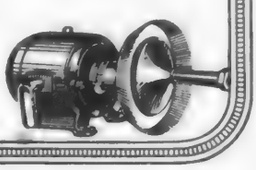
contains information on how to equip your building so you will have a continuous supply of air, equal in purity to the after shower breezes, and at a practically uniform temperature the year around.

The Bayley Turbo Air Washer

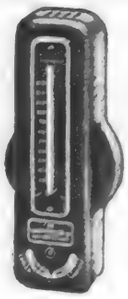
removes impurities from the air by passing it through a fine water screen, increases or decreases its relative humidity to a predetermined standard and regulates its temperature to any desired degree.

Write for your copy of the free book today.

Bayley Mfg. Co.
Dept. E
Milwaukee, Wis.



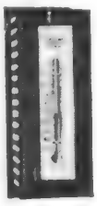
The Powers Thermostat—



Built on the vapor disc principle—the heart of the *Powers System of Temperature Regulation*—its sensitiveness to thermal changes is as immutable as the underlying principle of mathematics.

Put in *Powers* and forget it. You will find it just as ready to give accurate service when the heat is turned on in the Fall as it was all the Winter and Spring before.

Cheapest in cost per year—highest in service and satisfaction.



(1768)

It Pays To Be Sure

Therefore, be sure that it is *Powers Regulation* wherever Automatic Heat Control is used.

WHY? Because *Powers Regulation* operates, year after year, requiring no expert adjustment or inspection. It is correct at first and it stays correct—quietly, effectually.

The first cost is usually higher than for other systems—but isn't it worth it?

You are building for your future peace of mind if you insist upon *Powers*—the System famous for continued service.

THE POWERS REGULATOR CO
Specialists in Automatic Heat Control

R954 - 126 East 44th St., New York 2718 Greenview Avenue, Chicago
565 Boston Wharf Bldg., Boston
The Canadian Powers and Regulator Co., Ltd., Toronto

Where character is concerned—

SERVICE

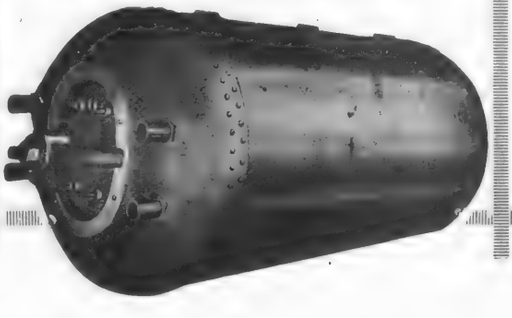
The Dahlquist Mfg. Co. are specialists in copper boilers. No order is too large or too small, for all receive that degree of care and workmanship that has put Dahlquist products in the front ranks. We also manufacture copper floats, coils, bends and expansion joints.

Even such an inert thing as boilers can have character. "Character," says Webster, "is a distinctive quality by which anything is distinguished from another." Which leads to the thought of **Dahlquist Copper Boilers.**

Copper being recognized as the best metal for wear and service, it follows that the "Dahlquist Specialists" in copper boilers turn out products of character and quality.

Let us figure on your requirements

Dahlquist Manufacturing Company
40 West 3rd St. Boston, Mass.



What Furnace Do You Know

that will *save 10 to 30% fuel? increase boiler power? eliminate dirty tubes? burn any grade of coal?*

—and burn the smoke besides?

You will immediately recognize the names of prominent architects and engineers who have recommended the Twin-Fire Hand Stoker in big office and industrial buildings.

They ***know*** that the time-tested

Twin-Fire
HAND STOKER
"It Burns the Smoke"

saves 10 to 30% fuel over plain settings—increases boiler-power—eliminates dirty tubes and burns any grade of fuel. ***They know it burns the smoke.***

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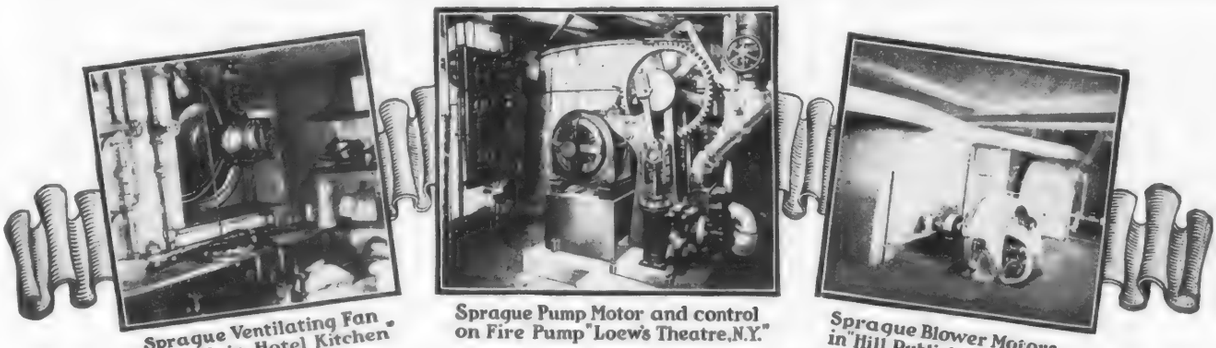
Would you like to have us tell you about some of the buildings Twin-Fire equipped?

TWIN-FIRE FURNACE CO.
1253 1st National Bank Bldg., CHICAGO
"Successful Furnace Builders Since 1898"



Sprague Ventilating Fan in "Mc Alpin Hotel Kitchen"

Sprague Pump Motor and control on Fire Pump "Loew's Theatre, N.Y."

Sprague Blower Motors in "Hill Publishing Plant"

SPRAGUE EQUIPMENTS SATISFY

It Pays to Put in Equipment that Satisfies

Sprague Ventilating Fans, Pump Motors, and Blower Drives have stood the test of time. You will find them doggedly doing service day and night, down in the vitals of many conspicuous buildings in our great cities.

They can be depended upon. They are made *right* and are backed by one of the oldest manufacturers of electrical apparatus in the United States. Write our nearest Branch Office today.

SPRAGUE ELECTRIC WORKS
Of General Electric Company
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Surface Barometric and Jet Condensing Equipments for Power Plants.
Main, Auxiliary, Distilling Condensers & Evaporators for Marine Service.
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Crosshead Guided" Expansion Joints
Ross Boiler Feed Water Heaters.
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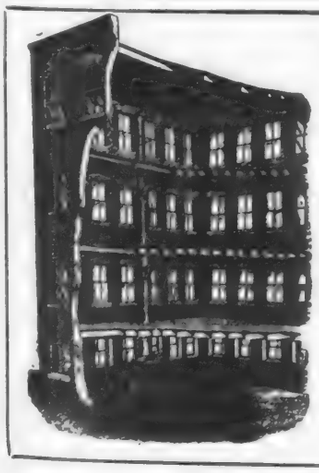
ROSS HEATER & MFG. CO., Buffalo, N. Y.

THE BRAND THAT LEADING ENGINEERS DEMAND



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Adapted for heating and ventilating large buildings. No need of distributing pipes. Takes full advantage of the laws of nature in the production of warmed air and utilizes these laws in providing an even distribution of warmth and comfort throughout the largest of buildings.

Sales representatives wanted

PORBECK MFG. CO.
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The Dunham Vacuum Heating System Heats This School

School: The East Side High School, Des Moines, Iowa.

Architects: Proudfoot, Bird and Rawson, Des Moines.

Radiation: 15000 square feet direct radiation supplemented by indirect heating coils and two full housed direct-connected supply fans, 12" diameter wheel.
The heating and power plant is in a separate building, 300 feet distant, which houses the swimming pool and gymnasium.

Detailed technical bulletin of the Dunham Vacuum Heating System on request.

C. A. DUNHAM CO.
230 East Ohio Street Chicago, Ill.

The DUNHAM HEATING SERVICE
REG. TRADE MARK

Banner Rock Wool Jacket

FORMERLY KNOWN AS

BANNER ROCK WOOL QUILT

The same unequalled hot surface insulation adaptable for insulating Tanks, Tank Cars, Boilers, Heaters, Stills, Ovens, Kilns, etc., manufactured under the same patents by the same concern.

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BANNER ROCK PRODUCTS COMPANY

ALEXANDRIA INDIANA

FOR UNDERGROUND STEAM OR HOT WATER PIPES

THE ORIGINAL RIC-WIL METHOD

embodies more original ideas, more advanced engineering, and more good practical features than any other system on the market. The material, construction, installation methods and practical results which, combined, form what we call the RIC-WIL Method, appeal with equal force to the engineer, to the practical operating man and to the business executive. Let us send you a copy of our descriptive Bulletins 1-3. Write to-day.

The RIC-WIL COMPANY CLEVELAND

A—Inner Shell, 2 inches thick.
B—Asphaltum Packing.
C—Dead Air Space.
D—Outer Shell, 1 inch thick.

Cover Your Steam Pipes with

Wyckoff's
Improved
Cypress Covering

Not affected by wet and dry conditions common to steam-pipe trenches. Will not rot. Absolutely water and steam tight. Each shell is wound with extra-heavy steel wire. Coated all over with the best known preservative—**Montezuma Asphalt.**

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A. WYCKOFF & SON CO.
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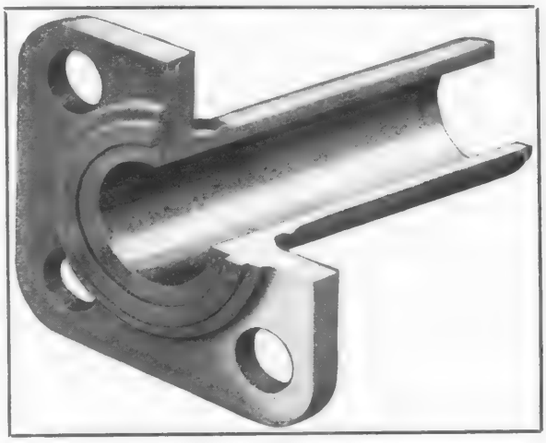
A BIG STEP FORWARD
In Joint Construction

The new WHITLOCK Joint **(illustrated)**
embodies the following improvements:



1 Flange attached to pipe with resistance welds. No threads. Absolutely tight.

2 Strength greater than that of threaded joints.

3 Material is of forged steel of same analysis as pipe against malleable iron.

This joint has been thoroughly tested in active service.

Good news travels fast and although the new WHITLOCK Joint is a recent improvement, one refrigerating engineer so far this year has used over 150,000 feet of pipe with the WHITLOCK welded on flange.

Our engineers will be pleased to explain this new durable construction and to give you an estimate on the savings possible in your plant through its use. Address nearest branch office.

THE WHITLOCK COIL PIPE CO.

HARTFORD, CONN.

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Elliott Deaerator—

by removing dissolved gases from water, it prevents corrosion of hot water piping

Corrosion—

the destroyer of piping, can be eliminated

Left to itself, you know that your piping, especially the hot water piping, will corrode away and rust itself out in a comparatively short time. This terrible waste, the product of corrosion, is preventable!

It has been proven that it is the oxygen and air dissolved in the water that is the primary cause of the corrosion and rusting of your hot water piping. The problem, then, is to remove the dissolved air and oxygen from the water before it is pumped into your piping system. This done corrosion cannot develop and your piping will last indefinitely.

The removal of air and dissolved gases can be accomplished with an Elliott Deaerator. The process is simple. Water is first heated, then distributed into a region of vacuum, where the water boils explosively, and the dissolved gases are liberated. The elimination of these gases is accomplished beyond the limit of determination—seventeen parts in one hundred million, so that almost perfect removal of oxygen is obtained. At least 97 percent of dissolved oxygen in natural water must be removed before freedom from corrosion is assured.

The Elliott Deaeration Process is a real investment in piping insurance and protection. The operation is simple. You can check at any time and prove for yourself the oxygen removal that is being obtained. Ask for full details.

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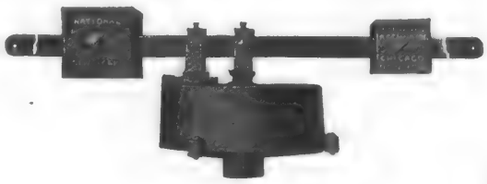
HOT WATER LOW PRESSURE

2" for Hot Water



7" for Low Pressure and Vapor

Made in 2", 4", 7" and 10" sizes

Metaphram Damper Regulators

For Low Pressure and Hot Water Boilers

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Metaphram Regulators

For Hot water Tanks, Ovens, Pots, Driers, Refrigeration and other industrial processes.

Send for Circulars

TRADE METAPHRAM MARK REG U.S PAT OFFICE

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FACTORY AND GENERAL OFFICES
208-212 South Jefferson Street
CHICAGO

VAPOR

A-JACKS for HIGH PRESSURE

TRADE MARK STERLED

The Sterling Slide Valve Return Trap

Patent applied for

Will thoroughly drain return lines of heating systems, eliminate air without loss of vapor and return water to the boiler against pressure.

It will lift liquids to a higher level where steam or air pressure is available.

It can be placed as low as 3 inches above the water line of the boiler, thus making it possible to install vapor systems in basements with low ceilings.

A cure for sick Vapor Heating Jobs

STERLING ENGINEERING CO.
419 Third Street MILWAUKEE WISCONSIN

By Repute "Always" Reliable

Mason Reducing Valves have an extraordinary reputation for three things—long life, continuous service and reliability, which is, after all, only a natural tribute earned through merit

MASON REDUCING VALVES

are made in many types and sizes, and every type and every size can be depended upon to reduce and maintain pressure at the proper delivery point, regardless of the fluctuation in the initial pressure.

To make your assurance doubly sure, Mason service is never separated from Mason products.

If pressure regulation problems trouble you, make use of our service.

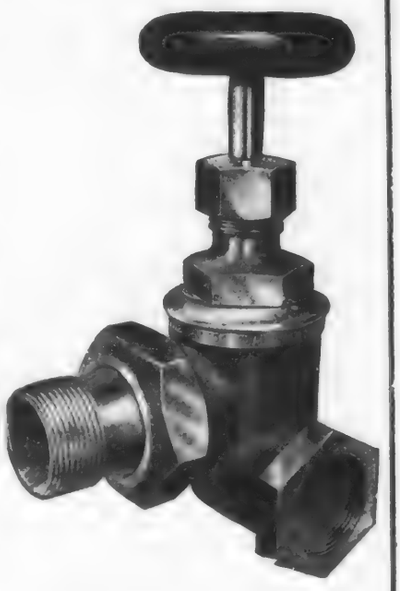
MASON REGULATOR COMPANY
Boston, Mass. San Francisco, Cal. Montreal, Canada

KENNEDY
RENEWABLE-DISC RADIATOR VALVES

Unfailing reliabilty of service, reasonable prices and the guarantee of satisfaction that a long established company is able to furnish, make Kennedy Radiator Valves the best buy for team and hot water service on the market.

We can honestly recommend them for use anywhere, and invite a close scrutiny of those points of design and construction that set them apart as decidely superior. They come in every desirable type—straightaway, angle, offset, corner, etc.

Other Kennedy Valves for handling water, steam, oil, acids, gas, alkalies, etc., in more than 500 distinct types and sizes are at your service. Our catalogue illustrates and lists them all. Send for a copy.



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CAPITOL PACKLESS QUICK OPENING VALVES

Have opposing seats.

Can be used on either pressure or vacuum systems.

Perfect in every detail.

CAPITOL PRODUCTS ALWAYS SATISFY.

Write for catalog and prices.

CAPITOL BRASS WORKS
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A Better Regulator—

THE Davis Pressure Regulator, when used to reduce steam for heating plants, is positive in action because gravity-controlled by weighted lever arm—no packing—no springs nor diaphragm to get out of order. Davis construction assures minimum attention and repairs.

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Water Control Valve
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It reduces steam to the exact lower pressure needed for heating systems. Supplies uniform pressure regardless of fluctuation in boiler pressure.

Write the G. M. Davis Regulator Co., 436 Milwaukee Ave., Chicago, for details of the money-back guarantee covering this and the other specialties listed opposite.

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STEAM SAVERS SINCE 1875

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"BYERS" GENUINE IRON and STEEL PIPE

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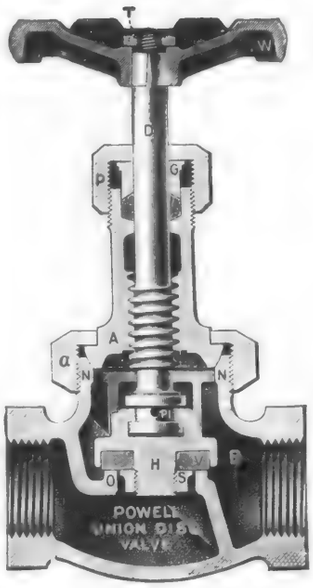
Send us your Blueprints or Specifications for Estimate

POWELL VALVES



UNION COMPOSITE DISC VALVES

ALWAYS DEPENDABLE

For Hot Water or Steam Heating

Notice the Union Bonnet Connection

Ask your dealer for Powell Valves

The Wm. Powell Company
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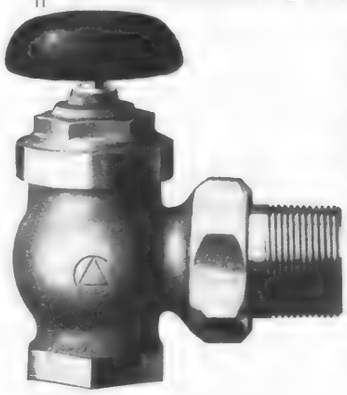
First In Appearance Quality and Service

The new "Genuine Detroit" Packless Radiator Valves, Bellows Type, are the result of years of experience in the design and manufacture of Radiator valves.

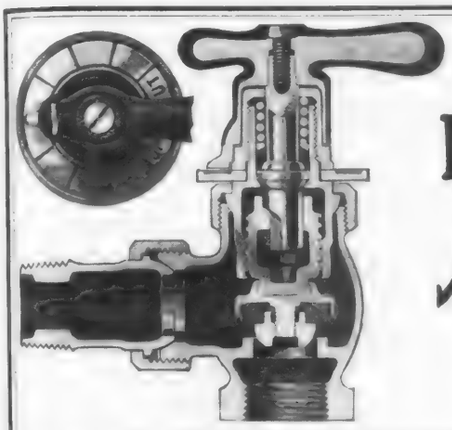


They are a high grade product of handsome design and are built for long life and freedom from trouble.

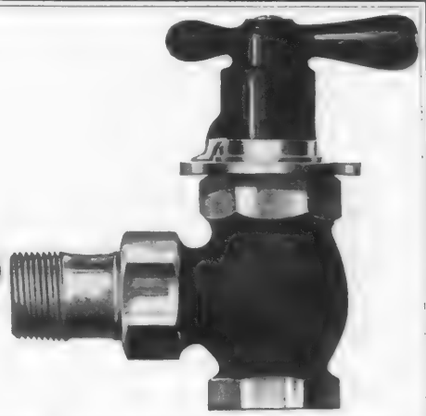
Where other valves leak and result in damage to surroundings—they do not do so.

Manufactured in all necessary styles and sizes for steam, hot water, vapor and vacuum heating systems. Let us send you booklet giving full information.

DETROIT LUBRICATOR COMPANY.
DETROIT, U.S.A.



MARSH
RE-ENFORCED
MODULATED
VALVES



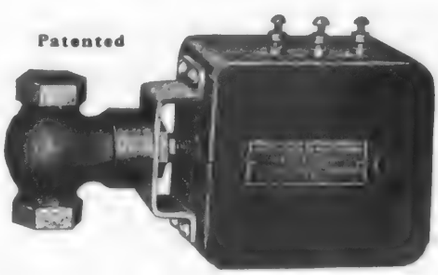
SOMETHING ENTIRELY NEW!

Nothing like it in Modulation valve handle construction, giving the same seating force in closing valve and smoothness of operation as with a wood wheel, completely doing away with side strain and necessity of having to reach over or around valve to operate same.

Catalogues, Lists and Discounts on Application

MARSH VALVE COMPANY, DUNKIRK, N. Y.

Patented



The
HORNUNG
Magnetic Valve

This is the little valve used as a pilot on all sizes of HORNUNG PRESSURE and TEMPERATURE CONTROL VALVES. It has many other uses.

Ask for Catalogue No. 14

CENTRAL HEAT APPLIANCES

J. C. HORNUNG

343 South Dearborn St. Chicago

American

Gauges; Gauge Testers; Steam Engine Indicators; Steam Traps; Feed Water Filters; Recording Thermometers, Pop Safety and Relief Valves; Whistles; Counters and Clocks are backed by 70 years' experience. Write for Catalog No. 70.

American Steam Gauge & Valve Mfg. Co.
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$53.NET
WITH WEIGHTS

VICTOR
Damper Regulator

For boiler pressures up to 150 lbs. per sq. in.

Sold with an absolute guarantee. Also made for lower and higher pressures.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE

281 South Street Newark, N. J.

Reducing Valves, Damper Regulators, Hot Water Regulators, Float Valves, Etc

THE DOUGLASS HUMIDIFIER

STANDARD TYPE
Made in three sizes for direct connection to steam piping

Is attached directly to the steam heating system

Discharges dry steam noiselessly

Gives satisfactory results in any type of building equipped with steam

Inexpensive to install

Will not get out of order

No attention required

No maintenance expense

Made in various sizes and types to suit all conditions and requirements

Illustrated catalogue sent on request

THOMAS J. DOUGLASS & CO.
352 Whiting Street
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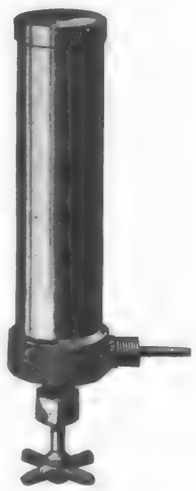
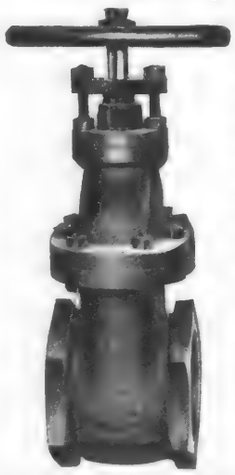


RADIATOR TYPE
Is attached to steam radiator in place of the air valve. Made in one size only.

TRADE JENKINS MARK Jenkins Bros

Jenkins Standard Iron Body Gate Valve



Double face, solid wedge type. Body and bonnet of high grade cast iron. Bronze spindle and seat rings. A durable valve throughout made for maximum service.

Wedges have guides which are fitted to slide true and easy on ribs in body and thus prevent disc from chattering when partially open, or from touching seat except at point of final closing.

Valves can be packed when wide open and under pressure.

Know the genuine by the Jenkins "Diamond" and signature.

Fig. 325 Jenkins Standard Iron body Gate Valve with inside screw and stationary spindle Screwends.

JENKINS BROS
New York Boston
Philadelphia Chicago
London Montreal

Jenkins Valves
SINCE 1864

BAILEY METERS

BAILEY FLUID METERS record and totalize the flow of steam at any pressure or temperature, boiler feed, condensate, circulating water, or, practically any fluid flowing in a pipe. These meters are ideal for the measurement of low pressure steam as used for heating, because pressure and temperature records may be included on the same chart, giving the complete story of the steam supply. This makes it possible to calculate the actual B. T. U. supplied to a customer, and is conclusive evidence in case of any question regarding the supply. The pressure compensator has been in service for some little time. This device automatically corrects the totalizer readings for pressure changes, so that actual steam flow may be read directly from the meter.

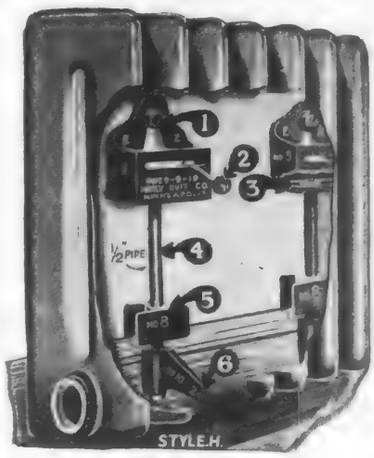
BAILEY BOILER METERS accomplish more real results toward obtaining maximum efficiency and capacity from boiler operation than all other meters or instruments combined, because they record rate of Steam Flow from the boiler, the Rate of Air Flow through the furnace, and the Flue Gas Temperature on a single uniformly graduated chart. The Steam Flow shows the rate of steam production. The Air Flow shows the amount of air supplied for the support of combustion. The relation between these two records shows an excess or a deficiency of air supplied for the support of combustion. The Flue Gas Temperature is a sure indication of the condition of baffles and heating surface when considered in conjunction with the other records. Wind Box Pressure and Stoker Speed as well as a totalizer for the Steam Flow may be added

BAILEY WEIR METERS record and totalize flow of water or other liquids through V-Notch weir and are used for feed water, hot well discharge or other fluids at or near atmospheric pressure

Other Types of Meters as well as Recording and Indicating Gauges are made for different purposes, and nearly any problem in connection with the metering of fluids can be handled. Descriptive Bulletins sent on request.

BAILEY METER COMPANY
2037-E 46th ST. CLEVELAND, OHIO

SIX IMPORTANT FEATURES of *E-Z* RADIATOR HANGERS



STYLE H

1. One Bolt
2. Invisible Washer
3. Horizontal Adjustment
4. Vertical Adjustment
5. **Adjustable for Baseboard**
6. Made for Wall, and Column Radiation

STYLE R
Without Baseboard Adjustment
Reasonable Price

Made for all styles of radiation

Manufactured by HEALY-RUFF CO., Minneapolis, Minn.

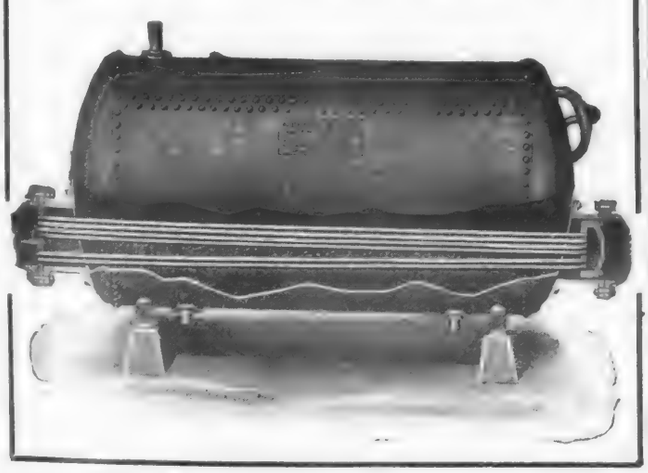
Save Steam

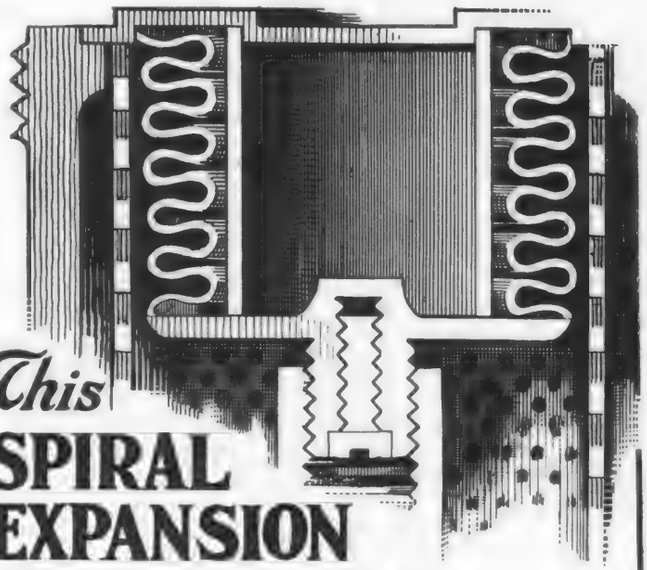
for your clients by specifying

ALBERGER (Buffalo) HEATERS

The hot water supply can be heated to the desired temperature with less steam with ALBERGER HEATERS, because both the water and the steam can circulate better, due to the extension of the heating element through the shell and the continuous drainage of the heater tubes. Designed for specified conditions. Write us for catalog now.

Alberger Heater Company, Buffalo, N. Y.





This **SPIRAL EXPANSION** *Gives Longer Life*

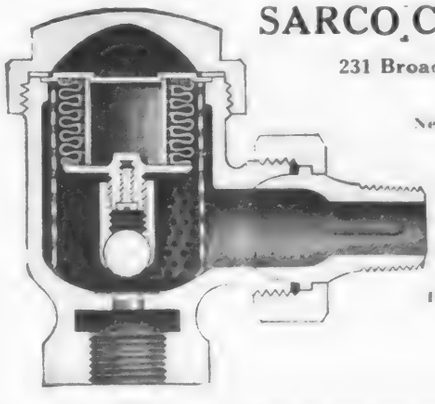
Instead of a short-lived annularly corrugated expansion element, the Radiator Trap Sarco contains a **spirally** corrugated tube. With this design the movement at any turn of the tube is so slight as to be hardly detectable. The movement is distributed over the whole area instead of being confined to a few points, which lengthens the life of the tube and the efficiency of the trap.

Wear on the valve is minimized, too. The bronze metal ball, which fits snugly into the socket seat, works freely in all directions, distributing wear evenly and insuring perfect contact at all times in the

RADIATOR TRAP SARCO

Another feature of the Sarco that adds to its long life is the construction which prevents scale and dirt collecting in the valve. Line contact only is had between the ball and seat of the valve and this makes it practically impossible for scale to collect. The Radiator Trap Sarco is of unusually heavy construction and factory adjusted.

Other important advantages are explained in our booklet P-102. Send for it.



SARCO CO., Inc.

231 Broadway

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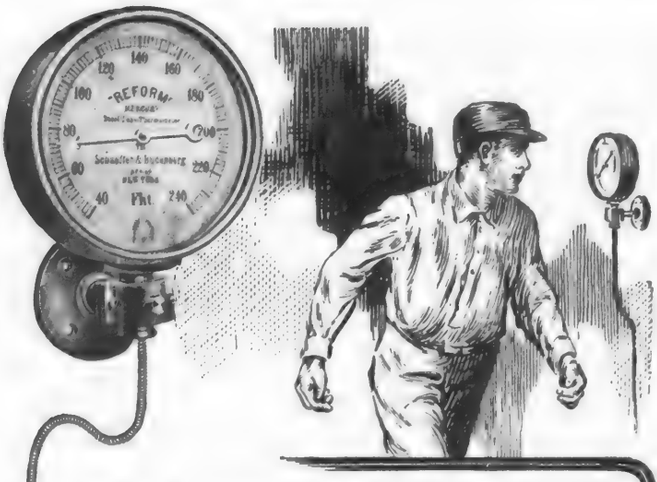


Columbia Reform Thermometers take care of Hard-to-get-at Places

A *Dial* Thermometer is always more quickly, easily and accurately read than a mercury tube thermometer—that's the first big advantage of the Columbia Reform Thermometer.

The second big advantage is that regardless of the location of the point at which the temperature is to be taken, the dial of this thermometer can always be placed out in the open where it can be read at a glance.

The bulb is installed in a feed-water pipe, condenser, economizer, or any other point, and the dial wherever it is most convenient to read same.

The Columbia Reform Thermometer puts an end to all the old difficulties and exasperations in keeping tabs on temperature at dark or inaccessible points. This obviously means a big saving of time and trouble.

Columbia Reform Thermometers are mercury actuated, therefore as accurate, dependable and sensitive as mercury glass tube thermometers.

This thermometer consists of a steel bulb, steel capillary tube and steel coil spring, all filled with mercury. The connecting tube can be supplied any reasonable length and the bulb is furnished for all applications.

Made for temperature ranges from 30° F. below to 1000° above zero.

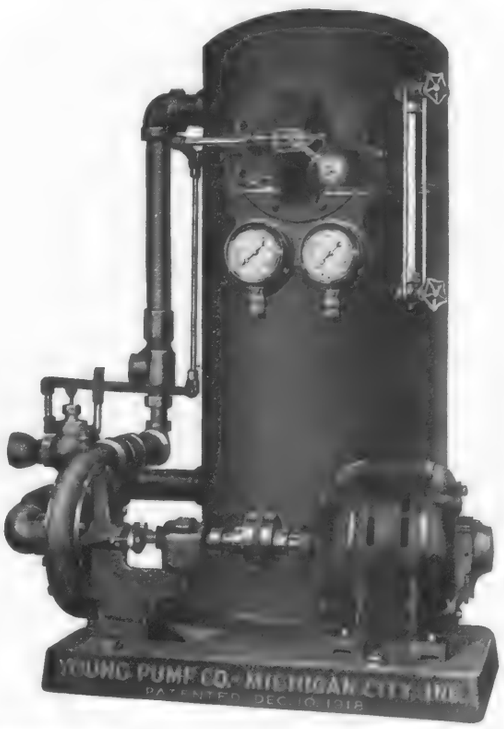
Our interesting catalog No. G-14 sent on request.

THE **Schaeffer & Budenberg MFG. CO.**

Makers of Columbia Recording Thermometers and Gauges with TIME PUNCH

BROOKLYN, N. Y.

Chicago, Detroit, Atlanta, Los Angeles, Philadelphia, Pittsburgh, San Francisco, Washington, Toronto, Ont.



They Come This Way!

JUST as you see the "YVM" outfit in the above illustration—that is the way the Young Centrifugal Vacuum and Boiler Feed Outfits are shipped. *Complete in every detail!* When received on the job, it is only necessary to make pipe connection to the system and boiler and wire connection to the motor. Then all is ready for operation.

The "YVM" is the simplest outfit made. There are no valves, springs or other parts that require adjustment, wear out or cause repair expense. It has a very low maintenance cost—in fact, the outfit is *economical in every way*.

Made in six sizes to handle 4,000, 8,000, 16,000, 26,000, 40,000 or 65,000 sq. ft. of radiation; for continuous operation or automatic control, to meet any condition or pressure.

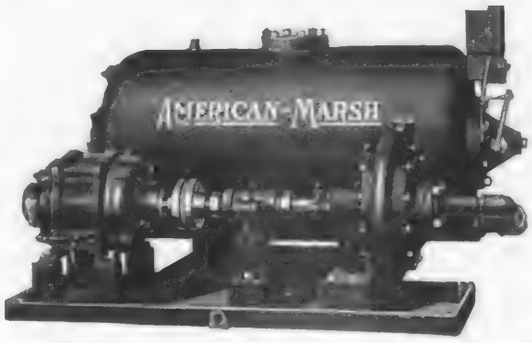
Young Pump Company

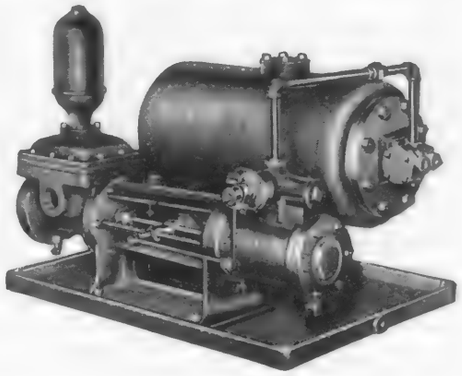
Michigan City **Indiana**

Chicago Office, 327 S. Lasalle St.

American-Marsh Condensation Pumps

Direct Acting and Centrifugal





American-Marsh Condensation Pumps are the result of over thirty-five years experience in the manufacture of high grade pumps for heating systems. They are built in the motor driven centrifugal type in both horizontal and vertical patterns, the vertical type being intended for use where the returns are laid on or under the basement floor.

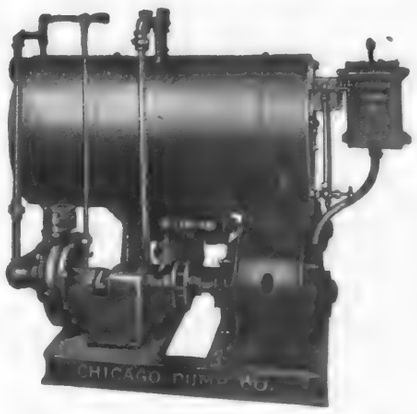
The steam driven pattern is equipped with the well known American-Marsh steam valve, the same as used on American-Marsh Vacuum Pumps. With this type of valve the pump positively cannot short-stroke or race. Steam pumps can be furnished to operate on steam pressures as low as 10 pounds. On pressures lower than this the motor driven type is recommended.

May we send you our interesting booklet covering pumps for heating systems?

AMERICAN STEAM PUMP COMPANY, Battle Creek, Mich.

Return Line Vacuum Pump

Each Pump Separately Controlled



Each Run Only as Needed

A return line vacuum pump that handles air and water individually, eliminates the waste of continually running two pumps when only one is needed. This is truly efficiency and economy.

CHICAGO PUMP CO.

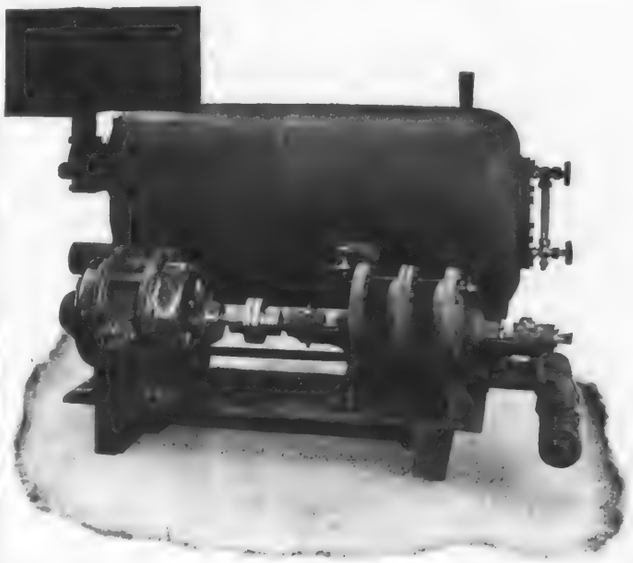
2325 Wolfram St., Chicago

YEOMANS

ELECTRICALLY OPERATED

CONDENSATION RETURN PUMPS

HORIZONTAL AND VERTICAL



SPECIAL TYPE H HIGH PRESSURE UNIT

RUGGED **RELIABLE**

Constructed to insure long life.

Superiority proven by years of experience.

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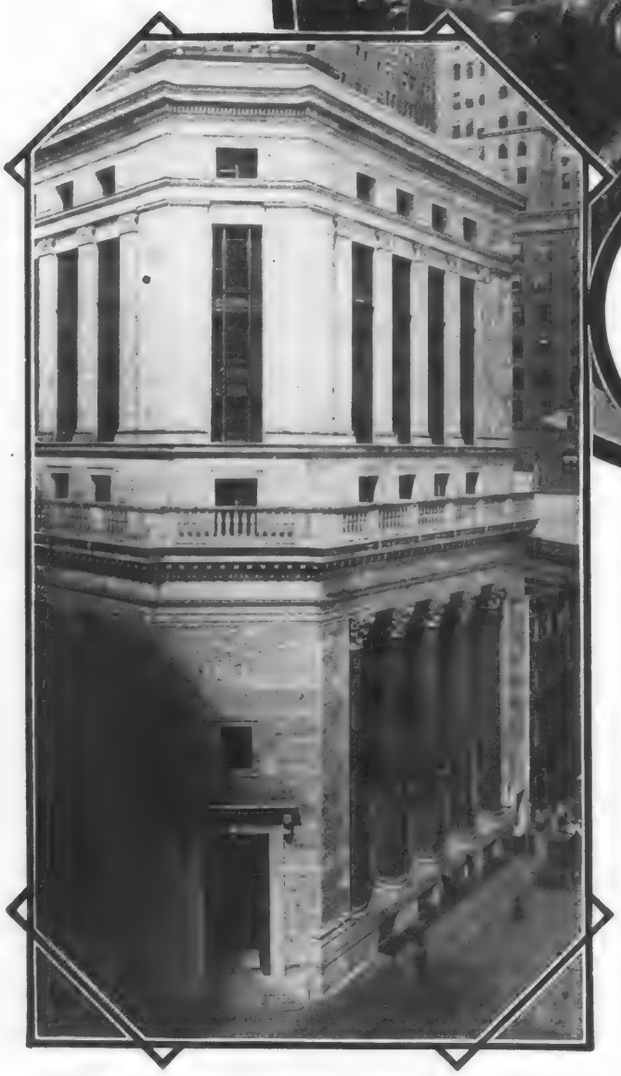
YEOMANS BROTHERS CO., 1421 Dayton St., Chicago, Ill.

Canadian Representatives: Darling Bros., Ltd., Montreal



Seaboard National Bank

THE selection of a ventilating motor for quiet, continuous operation always narrows down to a motor whose reliability is unquestioned.

The Westinghouse ventilating motor is reliable because it has the experience of a complete pioneer electrical organization built into it.

Above is an installation of Westinghouse ventilating motors at the new Seabord National Bank of New York.

WESTINGHOUSE ELECTRIC & MFG. CO.
East Pittsburgh, Pa.

Offices in all principal American Cities

Westinghouse

Full Complement of Building Pumping Units

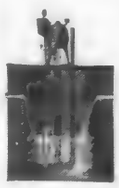
Automatic, Centrifugal, Vacuum and Boiler Feed Pumps

Fig. 2234

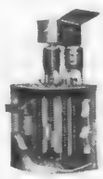
Capacities, 2500 to 65000 square feet direct radiation per standard single units.

Self Contained
High Class—Dependable

Cellar Drainers, Bilge and Sump Pumps, Sewage Ejectors



Duplex



Single

Capacities, 7 to 3000 gallons per minute.

Duplex Units, Double Capacity

Made in several types and specially designed to meet all conditions.

Automatic Condensation Pumps and Receivers

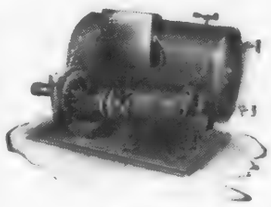
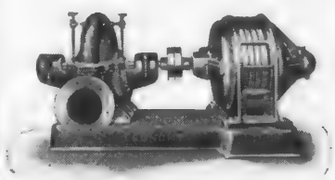


Fig. 2176

Capacities, 1000 to 125000 square feet

Made in following types: Horizontal, Vertical, and Underground. Also Piston types for extreme pressures.

Centrifugal Pumps for all purposes



Made either Single or Multi-stage

Boiler Feed house device. Hot water heating and Ice water circulating pumps.

All capacities and pressure from 5 to 5000 gallons per unit.

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122-124 N. Curtis St. Chicago, Illinois.

HARTMANN

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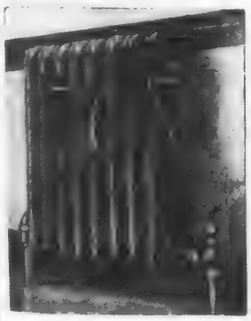

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NO WALL STRIPS
NO BREAKAGE
NO DIRT
INEXPENSIVE

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Sheet Metal Constructors
985 Dean St., Brooklyn, N.Y.

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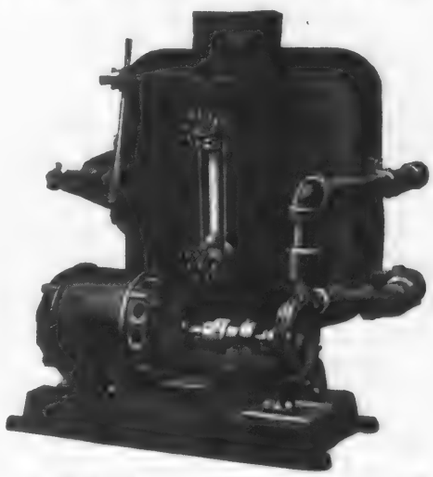
HEATING AND VENTILATING MAGAZINE CO.
1123 Broadway, New York City

WESTERN AUTOMATIC ELECTRIC CONDENSATION PUMP and RECEIVERS



RELIABLE SIMPLE

A single stage pump suitable for high or low pressure ranging from 10 lbs. to 100 lbs.

The unit is very compact, mounted on cast iron base, only two pipe connections necessary when installing. The receiver is made in two sizes, of heavy cast iron. An enclosed butt contact switch is used on all pumps.

Write for Bulletin No. 220

WESTERN ENGINEERING CO.
DAVENPORT, IOWA

ENGINEERS' SPECIFICATION INDEX

AIR COMPRESSORS.
Nash Engineering Co., So. Norwalk, Conn.

AIR CONDITIONING APPARATUS
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corporation, Philadelphia, Pa.
Buckeye Blower Co., Columbus, O.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
W. L. Fleisher Co., New York, N. Y.
Massachusetts Blower Co., Watertown, Mass.
Monsoon Cooling System, Inc., New York.
New York Blower Co., Chicage, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Company, New York.
L. J. Wing Mfg. Co., New York.

AIR COOLING AND DRYING SYSTEMS
Atmospheric Conditioning Corp., Phila., Pa.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
W. L. Fleisher Co., New York, N. Y.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

AIR ELIMINATORS.
Jas. P. Marsh & Co., Chicago, Ill.

Air Separators
Griscom-Russell Co., New York.
Hoffman Specialty Co., New York.

AIR WASHERS
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila, Pa.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
W. L. Fleisher Co., New York, N. Y.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

Automatic Sprinklers
Grinnell Co., Inc., Providence, R. I.

BLOWERS
Fan.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Porbeck Mfg. Co., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

Pressure.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co. B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

Rotary.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

Turbine.
Sturtevant Co., B. F., Hyde Park. Boston, Mass.
L. J. Wing Mfg. Co., New York.

BOILER BREECHINGS
Hartman Co., Charles, Brooklyn, N. Y.

BOILERS
Copper.
Dahlquist Mfg. Co., Boston, Mass.

Heating.
American Radiator Co., Chicago, Ill.
The Brownell Co., Dayton, O.
Central Radiator Co., New York.
Gorton & Lidgerwood Co., New York.
Gurney Heater Mfg. Co., Boston, Mass.
Herbert Boiler Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Page Boiler Co., Wm. H., New York.
Titusville Iron Works Co., Titusville, Pa.
Utica Heater Co., Utica, N. Y.

Down-Draft.
American Radiator Co., Chicago, Ill.
The Brownell Co., Dayton, O.
Chicago Down Draft Furnace Co., Chicago, Ill.
Herbert Boiler Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewanee, Ill.

Power.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS
Sarco Co., New York.
Schaefer & Budenberg Mfg. Co., Brooklyn, N. Y.

COILS, PIPE.
Buckeye Blower Co., Columbus, O.
Simmons Co., John, New York.

Air.
New York Blower Co., Chicago, Ill.

COOLERS.
Oil.
Griscom-Russell Co., New York.

CONDENSORS.
Alberger Heater Co., Buffalo, New York.
Alberger Pump & Condenser Co., New York.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONVERTERS, HOT WATER.
Patterson-Kelley Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

COVERING, PIPE.
American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
National Asbestos Mfg. Co., Jersey City, N. J.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A., Elmira, N. Y.

DAMPERS, DUCT
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Stark Sheet Metal Works Co., Canton, O.

DEHUMIDIFYING APPARATUS
Atmospheric Conditioning Corp., Phila, Pa.
Carrier Engineering Corporation, New York.
W. L. Fleisher Co., New York, N. Y.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DISTILLERS, (water).
Griscom-Russell Co., New York.

DRYING SYSTEMS.
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Hersh Brothers Co., Allentown, Pa.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DUST COLLECTORS.
Atmospheric Conditioning Corp., Phila. Pa.
Clarage Fan Co., Kalamazoo, Mich.
Hersh Brothers Co., Allentown, Pa.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DUST DETERMINATORS.
Atmospheric Conditioning Corp., Phila., Pa.

ECONOMIZERS, FUEL.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EQUALIZING LOOPS.
Hoffman Specialty Co., New York.

EXHAUST SYSTEMS.
Buckeye Blower Co., Columbus, O.
Hartmann Co., Charles, Brooklyn, N. Y.

ENGINES.
Steam, Automatic.
American Blower Co, Detroit, Mich.
The Brownell Co., Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.
American Blower Co., Detroit, Mich.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EVAPORATORS.
Boiler Feed Make-up.
Griscom-Russell Co., New York.

EXHAUST HEADS.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley, Co., New York.
Simmons, Co., John, New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wright-Austin Co., Detroit, Mich.

EXPANSION JOINTS.
Alberger Heater Co., Buffalo, N. Y.
Alberger Pump & Condenser Co., New York.
American District Steam Co., No. Tonawanda N. Y.
Crane Co., Chicago, Ill.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.

FANS, EXHAUST.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

FILTERS, (Aerating).
Griscom-Russell Co., New York.

Feed-water.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Simmons Co., John, New York.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Jenkins Bros, N. Y.

FURNACES, WARM AIR
Twin Fire Furnace Co., Chicago, Ill.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
McAlear Mfg. Co., Chicago, Ill.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Draft.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.

Hydraulic.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.

Ounce Graduated.
Jas. P. Marsh & Co., Chicago, Ill.

Pressure.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
American Dist. Steam Co., North Tonawanda, N. Y.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co. Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.

Vacuum.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co. Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.

Water.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
American District Steam Co., No. Tonawanda, N. Y.
Capitol Brass Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Atmospheric Conditioning Corp., Phila., Pa.
Monsoon Cooling System, Inc., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Company, New York.

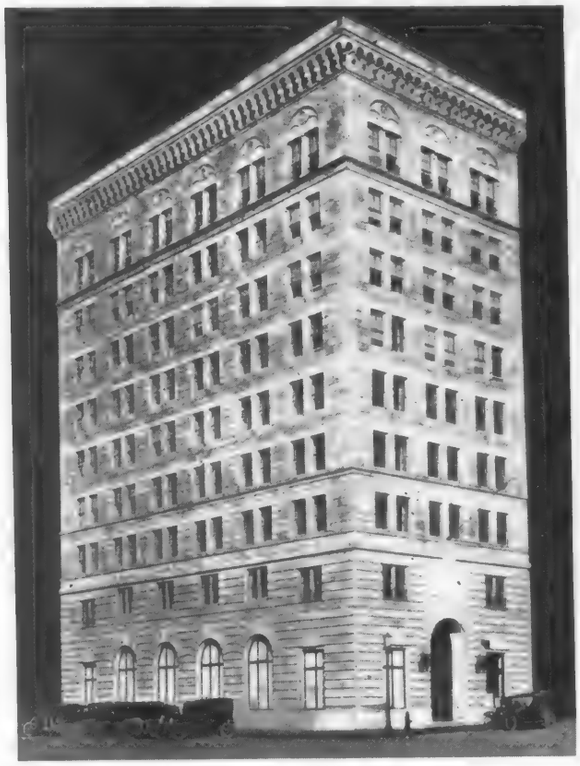
GOVERNORS, (pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co. Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

General Offices

BROTHERHOOD OF RAILROAD TRAINMEN

Cleveland, Ohio

CHARLES S. SCHNEIDER
Architect



Heated by Two S-4015
Utica-Imperial

SUPER-SMOKELESS BOILERS

PHEGLEY & SZEKELY
Heating Contractors

Assure Economical Heating by Specifying Utica-Imperial SUPER-SMOKELESS Boilers

General Offices BROTHERHOOD of RAILROAD TRAINMEN, Cleveland, Ohio, April 17, 1922

Utica Heater Co.,
30 Euclid Arcade,
Cleveland, Ohio.

Gentlemen:

In selecting boilers for our new building we went into the matter of "smoke prevention" and "economy of operation" very thoroughly.

We have 8,000 feet of radiation and a 500 gal. hot water tank that will equal 3,000 ft., so had two, sixteen section, Utica Super-Smokeless boilers installed of 10,250 feet each.

I have never during the past winter, used but one boiler at a time, it taking care of the tank and building on less than a ton of coal a day (24 hours) with average temperature on all floors of 74°.

I know most engineers will take exception to that statement, nevertheless, it is true.

For the month of January we used 26 tons, February 25 tons and March 19 tons of coal.

We have never had any complaint from tenants about cold rooms and are very well pleased with the equipment,—so much so that when you wish to show a prospective purchaser one of your boilers in operation it would be a pleasure to have you bring them here.

Yours sincerely,
R. E. PEOPLES,
Building Superintendent.

SUPER-SMOKELESS Boilers burn the cheaper grades of soft coal with remarkable efficiency. The heavy smoke is mixed with oxygen and consumed by the intensely hot, clean "Bunsen Burner" flames. Write for descriptive literature about the highly economical SUPER-SMOKELESS Boilers.

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UTICA, New York

ATLANTA
29-31 South Forsyth St.

BIRMINGHAM, ALA.
216½ North 21st Street

BOSTON
131 State Street

BUFFALO
2 Winslow Ave.

CEDAR RAPIDS
P. O. Box 78

CINCINNATI
410 Bell Block

CLEVELAND
30 Euclid Arcade

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CHICAGO, ILL.

COLUMBUS
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DENVER
1708 Broadway

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INDIANAPOLIS
321 North Penna. St.

5620 Grand Central Terminal
NEW YORK, N. Y.

LOUISVILLE
204 W. Chestnut St.

MILWAUKEE
701 First Wis. Nat. Bk. Bldg

MINNEAPOLIS
321 Third St., South

NASHVILLE
57 Arcade

OMAHA
728 World-Herald Building

PHILADELPHIA
1712 Ludlow Street

PITTSBURGH
945 Henry W. Oliver Bldg.

ST. LOUIS
1308 Olive Street

SALT LAKE CITY
180 W. First St., South

SPRINGFIELD, O.
8 West High Street

WASHINGTON, D. C.
714 Evans Building

ENGINEERS' SPECIFICATION INDEX (Continued).

HEATERS.

(Domestic Water.)

Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Central Radiator Co., New York.
Dahlquist Mfg. Co., Boston, Mass.
Excelso Specialty Works, Buffalo, N. Y.
Grinnell Co., Inc., Providence, R. I.
Griscom-Russell Co., New York.
Paterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Closed).

Alberger Heater Co., Buffalo, N. Y.
Alberger Pump & Condenser Co., New York.
Griscom-Russell Co., New York.
McAlear Mfg. Co. Chicago, Ill.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo. N. Y.
Simmons Co., John, New York.
Sims Co., Erie, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water (Open).

Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.

Griscom-Russell Co., New York.
American Blower Co., Detroit, Michigan.

Pipe Coil (Air).

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo. Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co.. B. F., Hyde Park, Boston, Mass

Unit

L. J. Wing Mfg. Co.

HEATING SYSTEMS.

Unit Blast.

American Blower Co., Detroit. Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buckeye Blower Co., Columbus, O.
Ilg Electric Ventilating Co., Chicago. Ill.
Skimmer Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co.. B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

Unit Air.

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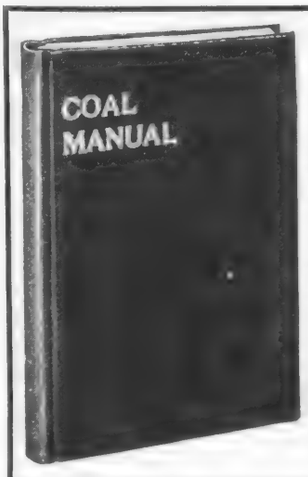

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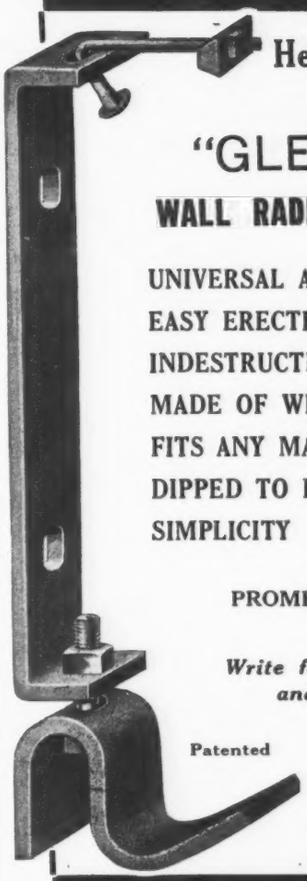

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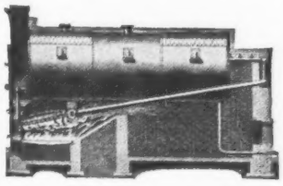

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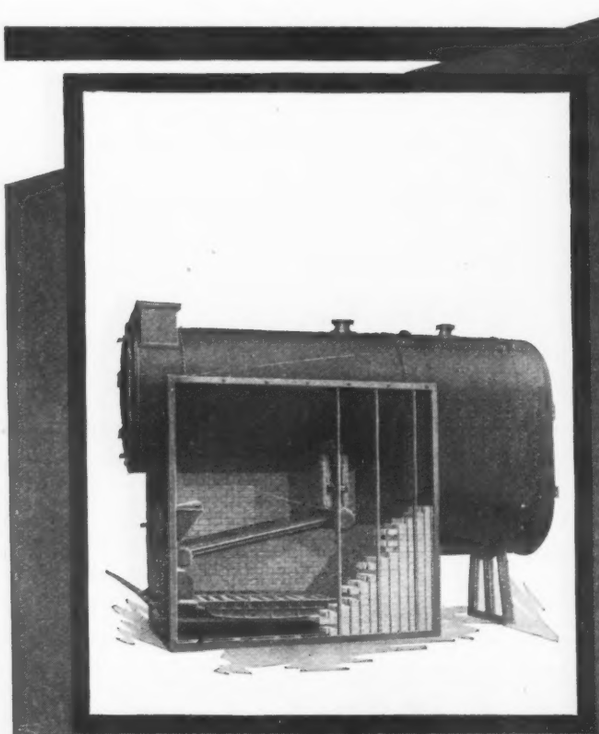

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